STRUCTURED CONTRACT STRATEGIES FOR CAPITAL AND OPERATIONS EXPENDITURE PROJECTS IN THE OIL AND GAS INDUSTRY

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Submitted in partial fulfilment of the requirements for the degree of
Doctor of Philosophy

School of Management
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2014

Abstract

There are enormous risks associated with complex construction projects, maintenance of assets in the oil and gas infrastructure environment, and in their operations. These infrastructure projects are complex and capital intensive. Corporations rely on engineering, procurement, and construction (EPC) contractors to build, maintain and operate these infrastructures.

The existing processes and methods used in establishing contracts are frequently very prescriptive, and not always appropriate or optimal for a given situation. There is little research on contracting effectiveness or optimal contracting in the oil and gas industry. To contribute to gaps in the literature, this research focuses on how the current prescriptive framework used in the oil and gas industry to form contracts can be improved in order to allow greater flexibility and thus add greater value, while remaining compliant. The four research issues developed from the theoretical framework for this study are as follows:

1. What are the methods used by corporations to arrive at the formation of contracting strategy?
2. How are the major drivers for contract strategy formation identified, evaluated and ranked in importance and impact?
3. What is the impact of identifying each risk element in the respective contract types (lump sum and reimbursable) and properly allocating the risks consistent with the contract type selected?
4. What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

This research gathered data using qualitative methods. A mixed methodology of interviews and questionnaires was used to gather the data, with purposive and

snowballing sampling techniques. Seventy (70) participants were interviewed and completed questionnaires. Each respondent represents a case.

Findings highlighted that the existing methods of contract strategy formation are lengthy and prescriptive, often resulting in delays and additional unnecessary expense to projects. Next, it established that national oil company directives and corporate policy, including the non-alignment of the drivers, may lead to the selection of suboptimal contracts. Furthermore, it established that the basic principles of risk allocation are not used in contract formation. Risk management strategy in the procurement process is seen by many to be deficient. Other findings are that the use of value-for-money contractors reduces overall project cost; that reimbursable contracts produce better quality work at lower cost; that Project Managers require expert guidance to form and select contracts that are sufficiently flexible to cater to the demands of specific situations of the contract.

The final theoretical framework of this research established a 'descriptive theory' of contracting in the oil and gas industry that reflects the operating environment in which the project manager operates. By establishing a 'theory' of contract formulation in the oil and gas industry, this research has made a useful and potentially significant contribution to the gap in knowledge of contract formulation in the oil and gas industry, an industry which anecdotally suffers from delays, cost overruns, and poor quality work (Williams, 1999, p. 273).

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Keywords

Capital Expenditure (CAPEX), Capital Project, Contract, Contracting Strategy, Construction, Cost overrun, Drivers, Downstream, Final Investment Decision (FID), Hydrocarbons, Midstream, Operating Expenditure (OPEX), Planning and Design, Optimal Contract, Procurement, Project Life-Cycle, Quality, Schedule overrun, Structured Contract, Total Cost of Ownership, Upstream, Variables

Definition of Terms

CONTRACTS

(Definitions developed from this research study)

Contracting Strategy

Contracting Strategy refers to decisions about if and how to complete the work, how to develop the project scope, pricing agreement decisions, selection of contractor/vendor, financing arrangements, and how to allocate the risks and rewards of performance (Ernst & Young, 2012).

Contract quilt

Company X contract quilt prescribes the type of contract to be used by each business unit for various types of project. Example; upstream business use reimbursable, LNG use Lump Sum, etc.

Structured Contracts

Structured Contracts are methodically generated standardized agreements which consider relevant variables in addressing all salient deliverables, issues, and risks.

Variables

Variables are terms in contracts/agreements that are of a changing nature pertinent to the realisation of the deliverables.

Drivers

Drivers are the main forces behind the materialisation of the deliverables specified in a contract. They are also referred to as the main objectives/reasons for the contract agreement.

Optimal Contract

An optimal Contract is one which is structured and cost effective, and which takes into account issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction in capital projects through proper allocation of risks.

PROJECTS

(Definitions developed from this research study)

Capital Projects

Capital Projects are large infrastructure projects defined in the order of hundreds of millions of dollars. They provide a huge impact to the business, a major asset. These projects has 'beginning and an end, conducted by people to meet established goals with parameters of cost, schedule, and quality' (Buchanan & Boddy, 1992, p. 8)

Project Managers

Projects Managers (PMs) are defined as men and women who have the judgment and experience to manage projects throughout its lifecycle - engineering, fabrication/procurement/construction and commissioning. The project manager is also responsible to manage 'conflicting stakeholders' aims and objectives and act effectively in the face of a constant stream of unpredictable problems. PMs are not

necessarily people who understand and apply the latest sophisticated planning tools' (Brady et al, 2012, p. 730).

Total Cost of Ownership (TCO)

The total cost of ownership (TCO) for a capital project includes the total of all costs to design, purchase, construct and operate. Most of the costs for these elements can be internal or indirect costs paid to external parties.

OIL AND GAS INDUSTRY SECTOR

(Definition is extracted from encyclopedia)

Upstream

The upstream segment of the oil and gas industry is often called exploration and production. Companies search for prospective areas for potential reserves of oil and gas and perform geological tests called seismic tests to determine the size and composition of the resource, drill wells to 'explore' the basin, and if satisfied with results, in the production phase to extract the hydrocarbons.

Midstream

The midstream sector of the oil and gas industry involves the transportation, storage and marketing of various oil and gas products. Depending on the commodity and distance covered, transportation options can vary from small connector pipelines to massive cargo ships making trans-ocean crossings. While most oil can be transported in its natural liquid state, natural gas must be either compressed or liquefied for transport. The midstream sector also includes the storage of oil and natural gas, which balances the fluctuations between supply and demand and helps ensure a secure supply of energy products.

Downstream

The downstream sector involves the refining and processing of hydrocarbons into usable products such as gasoline, jet fuel and diesel. Refining is required since 'raw' hydrocarbons extracted from the ground are rarely useful in their natural form. The refining process is a complex chemical process that helps separate the hundreds of types of hydrocarbon molecules into useful forms. Petrochemical plants also break down hydrocarbons into chemical compounds that are used to create a myriad of products ranging from plastics to pharmaceuticals.

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List of Abbreviations

ACV	Approved Contract Value
BOGSAT	Bunch of old guys/gals sitting around talking
C&P	Contract and Procurement
CAPEX	Capital Expenditure
CAT	Computer Aided Technology
CII	Construction Industry Institute
CPFF	Cost-plus-fixed fee
CPIF	Cost-plus-incentive-fee
EPC	Engineering, Procurement and Construction
EPCM	Engineering, Procurement, construction and management
FEED	Front-End Engineering Design
FID	Final Investment Decision
FPI	Fixed Price Incentive
IOC	International Oil Company
JV	Joint Venture
LNG	Liquefied Natural Gas
LSFP	Lump Sum Fixed Price
MBA	Master of Business Administration
NOC	National Oil Company
OPEX	Operating Expenditure
PDCS	Project Delivery and Contract Strategy
PM	Project Manager
PQ	Pre-Qualification

PSC	Production Sharing Contract
RFSU	Required for Start-up
RI	Research Issue
SBJ	Structured Business Justification
TCO	Total Cost of Ownership

Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: QUT Verified Signature

Date: 05 May 2014

Acknowledgements

This thesis reports work done with the support of academic supervisors Dr Achilles Leontakianakos, Associate Prof Paul Davidson and Dr Bob Thompson, to whom I owe a debt of gratitude. I thank them for their advice, encouragement and constancy during the years of reading and fieldwork. Your expert advice, help and support was invaluable in completing this research. I am forever grateful.

To Diana (my wife), I extend my deep appreciation for your support and tolerance of my many hours away while I undertook this work. To add the demand of a PhD study which required me to spend a lot of time (in the day and at night) for the last 6 years in front of computer on top of a very demanding managerial job in Shell must have tested your patience beyond doubt. For this reason, I say sorry and thank you for soldiering on with looking after the family. I love you.

To my gorgeous daughters - Renata and Rozita, you are the winners in all of this work. You worked tirelessly with me by spending hours playing together in my study while I sat quietly in front of the computer. Thanks for the encouragements, and sorry that I was not able to play. But I am all yours now. This thesis is dedicated to all my three girls – Diana, Renata and Rozita. I love you all very much.

Next, I would like to acknowledge my mentors. First, I recall the speech of my late principal (Mr S.A. Akindeno) during my graduation from secondary school. He said, *"... the height which great men achieve is never through slumber but hard work"*. He further warned, *"keep your head, even while others are losing theirs"*. These words have been very inspirational and also motivating for me in the pursuit of this research study despite the enormous challenges.

Second, I would also like to remember late Professor Ambrose Alli. Your leadership of the then Bendel State of Nigeria which awarded scholarships (free tuition and books) to all primary and secondary school students studying in the state will be remembered forever. My family took advantage of the scholarship. We are forever grateful.

Third, I thank my parents – Mr Joseph Ikhinmwin Evbonu and Mrs Patricia Evbonu. Your hard work and dream has finally come through. There is indeed a doctor in the family. To my brothers, sisters, nieces, nephews, in-laws and extended family members – may God bless and protect you all.

Finally, doing this study has really thought me a lot about myself. I thank God for his strength which kept me going. God, to you be the glory.

Chapter 1: Introduction

The aim of this thesis is to report the research investigating contracting practices in the oil and gas industry, and to recommend a framework for general application in arriving at more efficient and cost-effective decision making in contract formation. Accordingly, this introductory chapter introduces the research undertaken, and the relevant published literature. The research explored the (general) literature and theory of contracts in order to develop structured contracts which are widely thought to be optimal for project managers in the oil and gas industry. This approach is based on a detailed review of the current corporate methods used in contract strategy formation in the oil and gas industry.

There are two central innovative components to this research: Firstly, emphasis is placed on studying the processes leading to the formation of contracting strategy, and not only on the selected contract strategy. The processes are analysed from a real world as well as a theoretical perspective. The second component is the development of a structured framework to be used in characterising different contract types and analysis of the process in the selection of different contract strategies. The conclusion is a 'descriptive theory' of optimal contracts that reflect the operating environment in which the project manager operates in any given scenario.

This chapter outlines the background (section 1.1) of the research, and its justification (section 1.2). Section 1.3 includes an outline of the remaining chapters of the thesis. Finally, section 1.4 contains the chapter summary.

1.1 BACKGROUND TO THE THESIS

This research was undertaken in the context of the oil and gas industry in which there has been little research on contracting effectiveness or

optimal contracting in project management. The existing processes and methods used by Project Managers are very prescriptive, which may not always be appropriate or optimal for a given situation. Not infrequently in the oil and gas industry, project managers lack guidance in the formation and selection of Contracts that are evidence-based in general, yet are sufficiently flexible to cater to the demands of specific situations.

As increasingly multi-billion dollar revenue-generating infrastructure is constructed, commissioned and operated around the world, the tasks of asset maintenance, logistics, environmental issues, personnel skills, supporting services, supplier and contractor integrity are of the outmost importance in making a project a success. Most of these services and products are outsourced to contractors, mainly from Engineering, Procurement and Construction (EPC) companies. Different locations around the world offer widely different challenges that the company must manage successfully. There are enormous risks associated with complex construction projects, often referred to as 'Corporate Mega Projects' (Brady et al., 2007, p2), and in the maintenance and operation of assets in the oil and gas infrastructure environment. The risk events are most likely to occur when the project is in a challenging location and there is a mandated need to meet local content and employment requirements and objectives.

The time frame for the development and execution of large projects is usually in the average range of 4-5 years. Sometimes, the lifecycle of a mega project can take longer than 6-8 years, raising particular challenges in technology, and in human resource management (for example in succession planning and career development). Most oil and gas Projects are capital intensive large scale projects that rely heavily on engineering, construction and procurement. The typical work breakdown in Oil, Gas, and Petrochemical industry is as follows: project management and engineering 20%, procurement 40%, and construction 40% (Berends, 2007). These projects are increasingly very complex. There are numerous

standards and regulations which are very prescriptive and rigid in nature. The need to comply with these standards is paramount and cannot be compromised.

Further, the capital costs of oil and gas projects may run into billions of dollars (Berends, 2000). Raising funds to finance projects is a major challenge in itself. Depending on the size of the projects, bank loans (debt) and/or equity are used by contractors/owners to finance projects. Because of the risks involved, loans usually are at relatively high interest rates, which add to the overall cost of the projects. Closely related to the issues of project financing is the need to ensure continued cash inflow and outflow for the owner and contractors during the work. These demands can be met only with an efficient payment system that does not starve the contractor of operational funds, ensuring that the cost of raising investment capital for project is kept low, yet also is fair to the contractor who is motivated to achieve quality project deliverables on time.

The lengthy duration and capital intensive nature of oil and gas projects put additional pressure on project managers to achieve project deliverables of schedule, cost and quality. Despite these taxing parameters, less and less time and cost is being allocated to designing, bidding, planning, and construction (Ng & Skitmore, 2002). According to Berends, the project completion clock starts once the project final investment decision (FID) is taken. Therefore, the pressure on the project can be intense, to achieve first gas or oil production schedule date due to feedstock and/or product supply commitment (Berends & Dhillon, 2004). In finance, the project's estimated completion date drives the date of the loan and conditions of repayment.

In addition to the above issues, the oil and gas industry is currently suffering from the ageing demographic of its workforce (Berends, 2000). The existing experienced workforce is rapidly retiring. As a result,

corporations are experiencing a major scarcity of staff with the equivalent experience and skill to replace their retiring experts. This adverse situation is one of the main reasons why most of these skills, services and materials need to be outsourced and managed effectively.

Despite these pressures, today's contracting environment is increasingly becoming a contractor's market. Contractors face a large demand that they cannot fully cover. The high demand for EPCM contractors to offer design, construction and management services for the different projects is constrained by the shortage in the supply of experienced contractors. The situation is further compounded by the shortage of qualified engineers within the owner organisations (Berends, 2000). Scarcity of qualified human resources is also affecting the capacity of contractors to handle multiple projects, and since contractors are in the business to make profits for their shareholders, they are forced into accepting jobs for which they have limited capacity to handle. More often than not, their existing workforce is thinly stretched to cover multiple projects. These actions have resulting consequences on quality, timelines and costs of projects.

Surprisingly, given the scale of oil and gas projects, and the inherent financial and other risks, there is little research on contracting effectiveness/optimal contract in the oil and gas industry projects. Therefore, project managers in the oil and gas industry typically receive little guidance in the research literature and theory about their contracting and procurement strategy. The current processes used for the selection of the contracting strategy are very prescriptive, complex, time consuming, and very much depends on the experience of the personnel involved, on a case-by-case basis. The complex and prescriptive nature of the current contract process removes the flexibility for project managers to respond to problems through appropriate change management, inspection and maintenance programmes. Hence, intuitive rather than evidence-based approaches underlie their decisions in formulating contracts.

The lack of guidance and the prescriptive nature of the current contract process has resulted in the selection of incompetent and inexperienced contractors, inappropriate contracting strategies, delays, and cost overruns in projects (Camps, 1996; Griffin, 1993). In addition, there is also an increasing frequency of deficiencies in risk estimation, uncertainty and complexity avoidance (Camps, 1996; Institute, 2006; Ernst & Young, 2012). In most cases, the owners' policies simply dictate the approach and the drivers used to select a particular form of contract. There is also lack of knowledge and process on how to identify, classify, rank and prioritise the drivers. This situation is further impacted by the shortage of quality and experienced decision makers with a consequent reduction in awareness of alternatives from which to choose.

Therefore, there is increasing need to generate contracting strategies with real options (flexibility). The generation of contracting strategies will provide contract and project managers with options to handle the changing risks. These options could be activated at appropriately selected intervals throughout the life of the project.

As a result of the continual changes in the contracting world, it is a significant challenge for the owners to design a contracting strategy that meets project objectives and is most cost effective over the lifecycle of the project. Successful contracting strategies used in the past have been challenged by these continuous changes, and often they cannot be judged to be applicable in certain locations and projects. Increasingly there is the need to generate contract strategies which take into consideration all the elements of a contract including location specific factors, market factors, risks, and corporation's policy (Camps, 1996) including the potential turning points in the given scenarios.

These continual changes in the modern day projects and project environments leads to 'uncertainties', an overriding characteristics of projects (Winch, cited in Winter et al, 2006, p. 640) and further contributes to the increasing 'complexity' which traditional project management methods are inadequate to deal with (Williams, 1999). The complexities referred to throughout this research study are in terms of organisational and technological practices (Williams, 1999). The term, 'differentiation complexities' in organisational practices refers to the number of hierarchical levels, number of formal organisational units, division of tasks, number of specialisations, etc.; while 'interdependencies' means the degree of operational dependencies between organisation elements. On the other hand, differentiation complexity in technological practices refers to the number and diversity of inputs, output, tasks or specialities; and interdependencies means the interdependency between tasks, teams, technology or input (Williams, 1999, p. 269). A third aspect of these definitions, according to Jones (1995) is the 'instability of the assumptions upon which the tasks are based' (cited by Williams, 1999, p. 270). Hence, complex projects do not 'behave the way we expect, often time-delayed and take time to emerge' (Williams et al, 2012).

1.2 JUSTIFICATION FOR THE RESEARCH

Organisations have contract formulation processes which they consider as optimal but are very prescriptive, designed to guide/govern the project manager's behaviour. However, little is known generally about how project managers implement these prescriptive frameworks (Tirole, 1999, p. 773. There is a need for theory of contract formulation in the oil and gas industry that better reflects the operating environment in which the project manager operates. This research is a first step in the development of such a descriptive theory of contract strategy formation

Gaps in Literature

The Construction Industry Institute (CII) commissioned a study of the main drivers to be considered for the selection of contracting strategies. The CII research study identifies the main drivers or factors for selecting project delivery and contracting strategy (PDCS) (Oyetunji & Anderson, 2006). In the CII study, twelve (12) main drivers were identified. Each of the drivers has a predefined project delivery and contracting strategy. However, the process requires key decisions such as ranking and setting priorities for the drivers. This action in order to be successful relies on the experience of the project managers and his team. This approach to ranking can be very subjective and relies on the quality and experience of those selecting the PDCS, and as such, it is possible that important or critical factors may be overlooked, creating problems during implementation.

The main issue with the CII Research Study is that while the alternatives are quite rigid, the ranking of the different drivers is left to the discretion and experience of the user. Areas of effective contracting may be omitted, such as risk management selection of a value for money contractor rather than the cheapest one, the role of trust between client and contractor in saving money, the drivers for commodities, products and service contracts, and the payment structure to fit the particular contractor, sub-contractors and the project. There is little published research that examines the theory of contract formulation in the oil and gas industry that better reflects the operating environment in which the project managers operate (Tirole, 1999, p. 773). Furthermore, little is known about how project managers utilise this prescriptive framework or the operating contingencies that influence how project managers interpret it, which is surprising given the value of contracts in the oil and gas industry and the potential for large savings in time and money.

This research purports to make a useful contribution to the gap in knowledge of contract formulation in the oil and gas industry, an industry which anecdotally suffers from cost and schedule overruns, and poor quality work (Griffith & Sidwell, 1997; Kamming, Olomaiyr, Holt, & Harris, 1997; Griffin, 1993; Williams, 1999).

Industry complexity and importance

The second justification concerns the industry complexity resulting from the numerous and sophisticated risks associated with the oil and gas industry. There is a common perception in the oil and gas industry that the world has effectively exhausted its available reserves of 'easy oil' (Casselman, 2011, p. 2). This dire perspective drives oil and gas corporations to be more inventive and prepared to go into difficult areas to extract hydrocarbons. This scenario involves heavy reliance on sophisticated extraction methodologies and often still unproven technologies such as those used in shale oil, oil sands, and other 'unconventional technologies'.

The use of these sophisticated technologies results in increased uncertainty, and also increases in the associated risks (Chapman & Ward, 2003; Kerzner, 2001). Risks can have positive and negative effects on achieving a project objective (PMBOK, 2008; Davidson et al, 2009; Mulchahy, 2003; Chapman & Ward, 2003). There is clear evidence that while corporations have the tools and processes to forecast upside risks and opportunities the challenge is in accurately assessing threats and forecasting the downside risks (Davidson et al, 2009). Proper risk identification and allocation to the parties that can best manage them in a contract still remains a challenge, with management 'too often deficient in its estimations of risk and the appropriate management of it (Davidson, et al 2009, p. 572). Hence, there is a need to ensure a general awareness of the elements of the risks and how to responsibly manage each of these elements in the design of contracts (Kerzner, 2001).

Each contract type selected by the owner has its associated risks (Davidson et al, 2009; Camps, 1996; Kerzner, 2001; Berends, 2007; Salanie, 2005). Traditionally, owners are known to have selected certain types of contracts at least partially so that risks can thereby be transferred to the contractors (Camps, 1996; Kerzner, 2001). However, this passing over of the risks to contractors comes at a certain price, and a high premium may be charged whether it is made explicit or not. There is evidence that this is a common practice in, for example, the construction industry (Construction Industry Institute, 2006; Mulchahy, 2003; Kerzner, 2001; Camps, 1996). However, Contractors are becoming even more reluctant to taking on risk which they see to be more appropriately carried by the project owner (Berends, 2000; Salanie, 2005).

In current practice, many owners do not spend the time necessary to properly identify risks and incorporate the costs of the appropriate risk mitigation strategy in a given contract (Camps, 1996; Salanie, 2005; Mulchahy, 2003; Ward & Chapman, 1991). Where risks are not properly identified and allocated, they may be pushed further down to other parties in the contract who are often not in a position to manage them effectively (Construction Industry Institute, 2006; Mulchahy, 2003; Camps, 1996). Extraordinarily high costs of managing risks and related information asymmetry during the project lifecycle are not uncommon (Howard & Bell, 1998). Inevitably, the owner must ultimately pay for the risks, one way or the other (Construction Industry Institute, 2006; Mulchahy, 2003).

It is self-evident that ignoring risks does not make them go away, and 'shifting the risks to the seller or contractor results in at least an additional 8 – 20% cost increase to the buyer' (Mulchahy, 2003). This passing over of risks could be as high as 30% of the total installed cost of projects paid for inappropriately allocated risks (Camps, 1996). In a real world example, 87 percent extra on top of the total installed cost was paid by one

of the LNG Projects in Africa as 'peace of mind' payment for risks in a lump sum EPC contract. While this practice may increase the contractors' profit, it makes no actual difference to the effectiveness of the risk management, and it has the undesirable effect of increasing the owners' costs and thus the overall total cost of investment in a project.

To achieve an optimal Contract, all risks must be taken into consideration and properly allocated (Salanie, 2005). This is a challenge for the Project Manager. Project Managers often do not have the capacity, knowledge, resources, experience and guidance to correctly handle the tasks of risk management especially in complex projects. Only an 'ideal PM' can possess all of these personal attributes of the necessary knowledge, skill and experience and such a person may be more an aspirational than a realistic possibility (Davidson et al, 2009).

The third justification concerns the shortages of experienced Project Managers and contract personnel in the Oil and gas industry. As seen above, the skill and experience of the PMs are heavily challenged with the 'technological complexity' of most projects (Kerzner, 2001). The oil and gas industry is very dynamic with continued technological invention. Reliance on previous project experiences and lessons captured from previous projects is no longer sufficient to deal with future turning points in the life of a project (Wack, 1985a).

Based on the recognition that all projects rest on a technological base, it is considered a necessity in managing technology risk to ensure that technological forecasting or at least some form of scenario planning is explicitly done (Meredith & Mantel, 2009; Wack, 1985a). Scenario analysis is a description of a consistent set of factors which define in a probabilistic sense alternative sets of future business conditions (Huss, 1988). Scenario analysis considers systematically qualitative variables, predicts turning points, provides an internal communications tools. While

inherently different from planning, it serves as a link between forecasting possible scenarios and the risks involved, and the planning and decision process that needs to follow (Huss, 1988).

For example, in relation to technology risk, even the most straightforward consideration of the possible changes in technology during the life of a 3-4 year project will show that the risk profile may alter substantially, thus requiring adaptations to be made in various areas of the management of the project (Kerzner, 2001, p. 903). More than a decade on, these challenges have not diminished. This lack of flexibility or knowledge/experience further requires the PM to receive proper guidance and to be creative as well as be allowed some level of flexibility in using this guidance.

A common view is that if technological forecasting is correctly carried out and applied in the selection of technology and contracts for the project, then this inclusion will lead to the selection of a 'value for money contractor' and a cost effective contract (Hartman, 2003). One of the main challenges here is the shortage of experienced Project Managers. Project managers in the Oil and Gas industry are usually professional engineers. Many of these experienced engineers are retiring as part of a distinct demographic in an ageing workforce (Mandil, 2005; Berends, 2007). When it is considered that PMs are responsible for developing the contracting strategy in conjunction with the Contract Advisers (Davidson et al, 2009),the question emerges as to whether the PMs have sufficient experience in contracting to be able to lead the development of a contracting strategy. If the PMs do not have the required experience, does this lack of experience of the drivers field affect the quality of the contracts they develop?

The implications of the above gaps and issues on Contract Strategy formation.

Contracts are formed using only the most relevant variables (Salanie, 2005). Hence a contract may be incomplete (Salanie, 2005; Tirole, 1999). This assertion is argued by several authors to be the case in theory and practice of contracts (Salanie, 2005; Tirole, 1999; Hartman, 2003; Kerzner, 2001). With little or no guidance in literature and with very rigid processes and procedures, it is not known how all the variables are identified, prioritized and ranked to select only the 'most' relevant variables to be included in the contract.

As projects are unique undertakings (PMBOK, 2008), the contract strategy needs to have flexibility to fit the unique requirements of a project (Davidson et al, 2009), providing alternatives from which the PMs may choose. This requires the The PMs then are required to be properly equipped with the experience and tools necessary to correctly identify the variables and to select the most relevant variables, given all the options. It also requires all the alternatives to be known and readily available. A contract strategy cannot be complete if it doesn't incorporate every part of the contracting process from how to select contractors to how to close out the contracts (Hartman, 2003).

The decision about the contracting strategy to be used for outsourcing is crucial to the success of the contract selection process for the new project. While the selection of a contract strategy may be influenced by the quality of participants in the contract workshop, it is less than desirable for this activity to be the major determinant. The question of the factors to be taken into account is far from simple, and requires consideration of everything from the high-level strategy to the detailed check sheets to ensure that all elements or risks are properly considered or evaluated. There are other general concerns which include the lack of process/procedures, the ageing workforce with fewer experienced junior

decision makers, and the lack of databases of knowledge or framework to use for these decisions. In addition, the lack of consideration of the theory of transactional cost economics (TCE) is also a major concern. TCE theory (developed by Coase in 1937) provides the rationale to explain the business decision to source a product or services internally or externally based on cost efficiency (Williamson, 1975). These critical decisions relating to project delivery and contracting strategy require careful analysis, as they will impact all phases of execution of the project and greatly impacts the efficiency of project execution (Oyetunji & Anderson, 2006).

In summary, it can be concluded that research literature on the management of projects and the associated contracting strategies has been slow in its conceptual development and still has only a relatively thin theoretical basis. One of the main hurdles in the study of projects has been the absence of cases allowing a distinction between the project type, the contracting strategy that it is part of, and its managerial and organisational style. This research contributes to improving the process of formation and selection of contracts in the oil and gas industry in order to achieve an optimal contracting strategy. To contribute to filling gaps in the literature, this research focusses on how the current prescriptive framework used in the oil and gas industry to form contracts can be improved in order to create greater flexibility and thus add greater value, while remaining compliant.

To achieve this result, the following questions were addressed.

Main Research Question:

How can structured contract strategies be established for the oil and gas industry?

In answering the main question, the following sub-questions also needed to be addressed:

1. What are the methods used by corporations to arrive at the formation of contracting strategy?
2. How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?
3. What is the impact of identifying each risks element in the respective contract types (such as lump sum and reimbursable) and properly allocating the risks regardless of the contract type selected?
4. What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

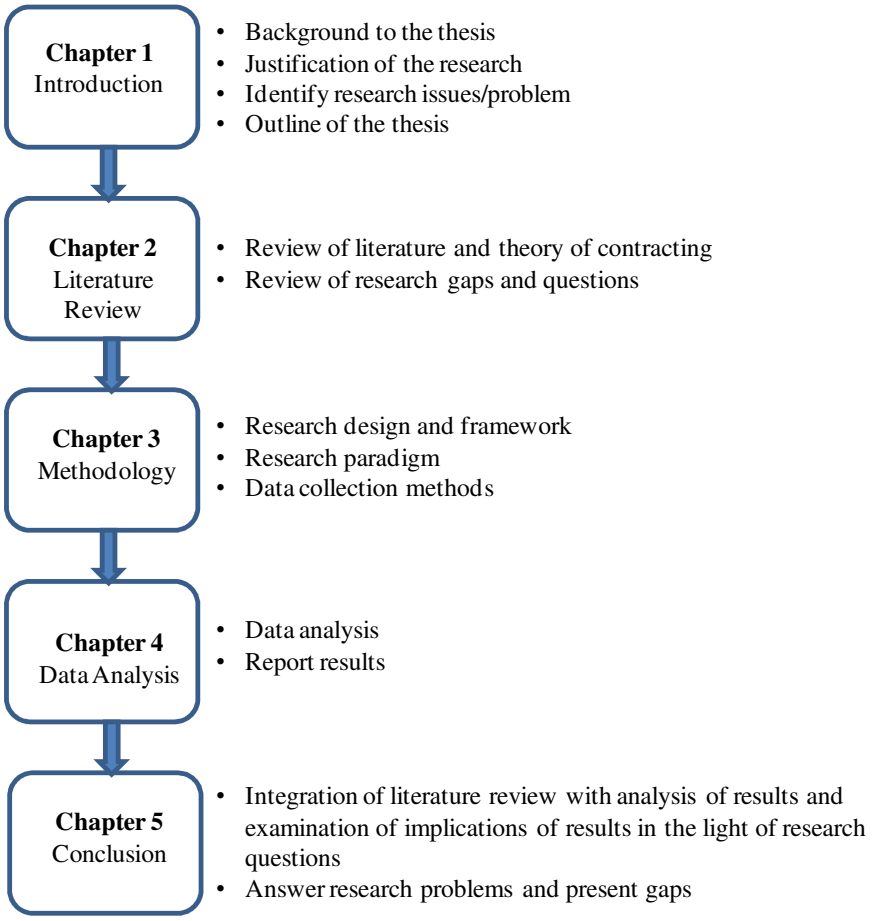
The above research questions cover a wide range of contexts so as to provide sufficient scope to study the existing contracting strategy formation and selection approaches. This facilitated the development of a theoretical framework for contract strategy formation. The framework is examined in the light of theory and findings from field research, to yield a basis for real-world guidance (Winter, 2006; Winter & Smith, 2006).

1.3 OUTLINE OF THE THESIS

The structure and flowchart of the thesis is as shown in Figure 1.1. The thesis is structured in five chapters as recommended by Perry (1998). Each chapter has sections as shown.

Chapter 1: This chapter introduces the background to the thesis and provides insight into the remaining chapters and structure of the thesis.

Figure 1.1: Structure of the thesis



Source: developed for this research

Chapter 2 contains the literature survey and the theoretical framework for the research. The approach used in the chapter is to use the theory of contract and literature to conceptualise the topic, identify the research issues, and define the questions for this research. This approach is used so as to achieve the following:

(i) To understand theoretical development of academic research within the general field of Contracting and how they have been applied in the oil and gas industry.

(ii) To explain the concept and findings within the real world of contracting in the oil and gas industry.

(iii) To create the theoretical framework to explore the background of the identified problems and to focus the data collection for this research.

Chapter 3 contains the design of the research project and the methodology used for the study. The chapter justifies the core steps of survey methods used to collect the data. These refer to population, sampling frame, sample design, sample size, questions and content issues, and bias issues (Davis & Cosenza, 1994). The methodology used for the data analysis is also discussed.

Chapter 4 establishes the current practices of contract strategy formation in the oil and gas industry. The data collected are analysed in order to establish the current practices. The patterns of the results and analyses are presented. The analysis of the data for their relevance to the research issues/problems or research questions is detailed in this chapter (Perry, 1998).

Chapter 5 brings together the theoretical and literature perspectives on how optimal contracting strategy should be formed and how contracting strategies are formed in the real world of oil and gas industry. This chapter evaluates the research findings and the conclusions that follow. The chapter also contains the recommendations for future research in this area, the overall conclusion to the thesis, and discussion of the contribution of this research to the existing body of literature.

1.4 CHAPTER SUMMARY

Based on the foregoing, it can be concluded that there are inconsistencies in the range of variables considered in the selection of a particular contract strategy. It is common for research into corporations to use convenience sampling. However, in the oil and gas industry, projects are not only unique but often very complex, in uncertain environments (Williams & Samset, 2010, Kurtz & Snowden, 2003, Williams et al, 2012, Williams, 1999). PMs frequently fail to identify, much less manage the most significant risks. Some of the variables which are not visible at the early stages are known to have their effect after the award of the contracts and during the project execution. Successful management of these late changes along with the consequent benefits of the project is critical to the successful completion of the project. The key challenge is still centred on identifying the variables used in the selection of a contract, ascertain whether the variables are the most relevant required to achieve optimal contract.

Furthermore, the experience and skills of the PMs to put together a successful and optimised contract strategy is heavily challenged by complex technology and uncertainties in the oil and gas industry. This situation invites the proposition that without being guilty of simplistic reductionism, it is possible that a schedule of contracts tailored to different scenarios of project variables may provide PMs with the much-needed breakthrough in these onerous tasks of developing a cost effective and optimised contract for a particular situation.

In the next chapter, a detailed discussion of the literature on Contracts in the oil and gas industry is provided.

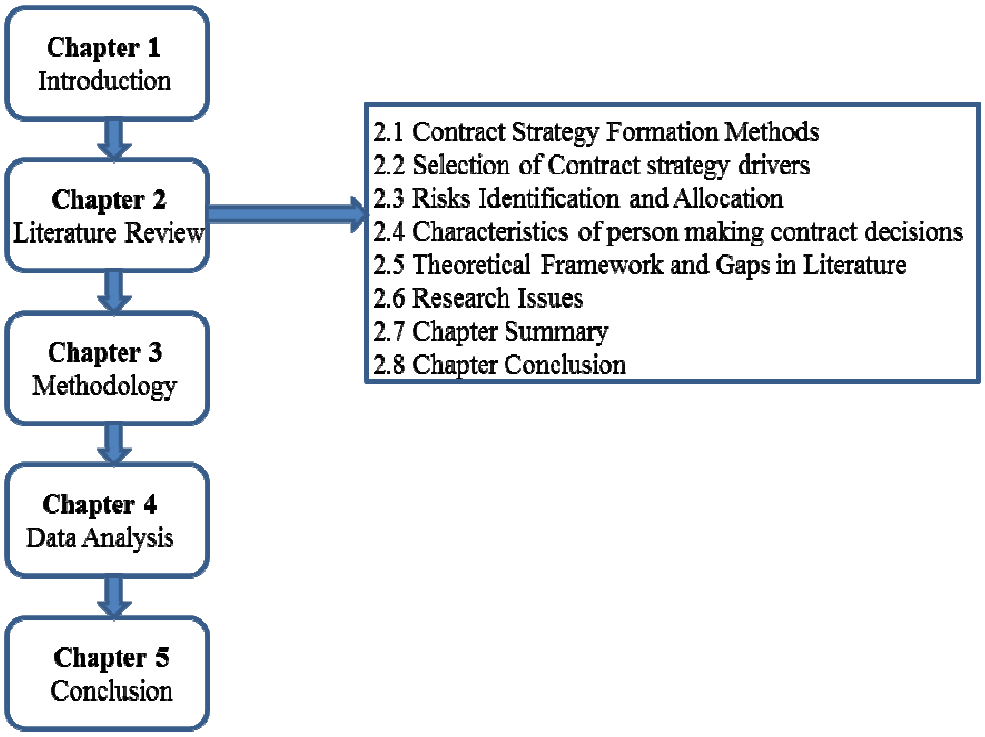
Chapter 2: Literature Review

The introductory chapter to this thesis concluded with the assertion that the current practice of contracting strategy formation used in oil and gas industry does not take into consideration all the relevant variables in the formation of contracts. Different authors and corporations use different variables prescribed by their corporations. The existing methods and lack of knowledge by project managers (PMs) may have the unintended effect of discouraging the proper identification of the project drivers, benefits, risks, and the interrelationships of the risks.

This chapter presents a review of literature of contracting. The purpose of this literature review is to demonstrate the gap in knowledge base in the formation of contracting strategies which this research programme addresses. The approach employed is to examine existing methods used for the generation of contracting strategies and identify gaps and weaknesses which will be addressed by this research programme. Existing theory evidenced in academic literature on contracting is reviewed along with a review of the practices adopted in the real world of the oil and gas industry. The theory and practice is summarised, to highlight the gaps from which the key research questions are drawn. The real world challenges of how to identify and manage the drivers of these practices are also investigated.

This review is conducted within the theoretical framework of traditional contracting which looks at theory of incentives, information, and economic institutions. These are generally referred to as contract theory (Bolton & Dewatripont, 2004). The approach used is largely descriptive but also investigates the implications of the theory and literature in the real world of contracts and project management (Williams & Samset, 2010)

Figure 2.1 Outline of chapter 2

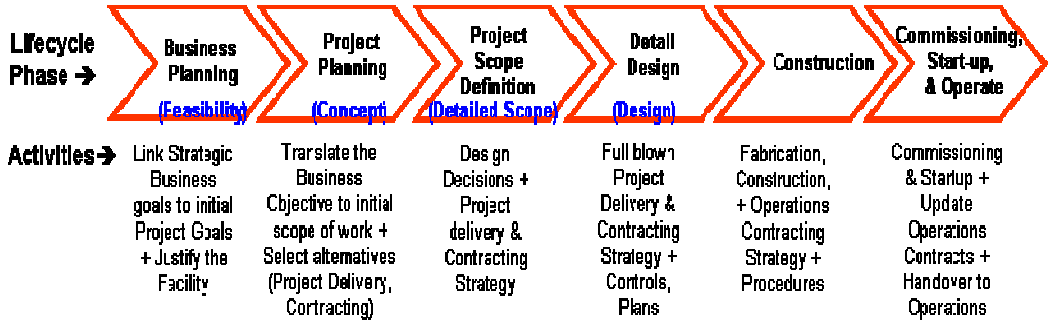


Source: developed for this research

2.1 CONTRACT STRATEGY FORMATION METHODS

In most corporations, Contracting strategy typically depends on the output of a Structured Business Justification (SBJ). This SBJ activity is undertaken during the business planning phase of the Project lifecycle. Refer to Figure 2.2 for the different stages of the project lifecycle and activities. A typical SBJ exercise is undertaken to define and understand the new project and its objectives. One of the major deliverables of the SBJ is the justification for the decision making body of the corporation that to decide that the new Project can proceed to the next phase of the project lifecycle. This approach became known as the stage-gate model (Cooper, 2005).

Figure 2.2: Typical Project Lifecycle - Project Delivery and Contract Strategy



Source: developed for this research

Figure 2.2 depicts a typical project lifecycle, defined as the number of phases that provide a fundamental structure for an appropriate project management process (ASCE, 1990). The figure is adapted from the Construction Industry Institute (CII) Implementation (RS113-2) report (Construction Industry Institute, 2006a). It is required to highlight the different activities in each project phase which contribute to the development of the contract strategy.

The content of the SBJ output includes: (i) business context, focus of the project, and challenges, (ii) identified stakeholders and analysis of their requirements and interest. (iii) identified factors/drivers of the new concept/project, (iv) definition of success, and plan, (v) analysis to determine opportunities and threats, strength and weaknesses of the new concept/project, and (vi) estimation of the work to complete the structured business justification exercise in order to gain the approval of the sponsors/National Oil Company to proceed to the next phase of the project.

Typical deliverables of the SBJ are: business justification statement for the new concept in terms of the firm's business objectives; crucial stakeholder information relating to their identity, interests, and how engagement is to be managed. This collection of data may include market analysis to identify buyers and suppliers including the prevailing market forces of demand and supply. It is likely to include the

capture and prioritising of business drivers (and alignment of conflicting drivers business and stakeholders' drivers).

As the new concept matures along the project lifecycle, other activities including investigation of the alternatives for project delivery and contracting strategy, and study of trade-offs between the alternatives, are carried out. This investigation supports the identification of risks and development of the contracting strategy. As part of the strategy – sourcing options for materials, services, and equipment are defined.

These methods result in delays in putting a contract strategy in place. Also, there is evidence of project managers' selecting the wrong contracts for the situation. Furthermore, there are inconsistencies across corporations in the methods used in the formation of contract strategies. Some of these approaches take into consideration the varied factors which affect the selection of the appropriate contract strategy. Surprisingly, it is not generally known which variables in particular are taken into consideration in the formation of the contract strategies and how relevant these variables are. The effectiveness of the current contract formation methods is also a major issue. The methods are based on the prescriptive framework which is available to PMs. Little is known about how ('actuality') PMs implement the framework or the contingencies that influence how PM interpret these presumptions (Cicmil, Williams, Thomas, & Hodgson, 2006, p. 675).

Typically, current contract strategy formation uses variables which are prescribed by their corporations. This approach, which is supported by the existing body of knowledge, points to the fact that not all variables are selected by the corporations. Indeed, usually only the variables thought to be most relevant are taken into consideration.(Salanie,2005),. This approach is argued by several authors to be the case in the theory and practice of contracts (Salanie, 2005; Tirole, 1999; Hartman, 2003; Kerzner, 2001). In particular, Kerzner stressed that the size of the contract is proportional to the ambiguity in the contract: the larger the contract, the greater the ambiguity in it (Kerzner, 2001). The issue therefore is to confirm if PMs or corporations deliberately leave out some variables in order to avoid ambiguity or

indeed they lack the knowledge or means to identify the most relevant variables. Furthermore, does the omission of certain variables affect the selection of optimal contract strategy? Given that contracts cannot be complete, does this incomplete selection of variables make it a suboptimal contract?

An optimal contract is defined in this research as a contract which uses the product of consideration of issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction in Capital Projects through proper allocation of risks.

The challenges of selecting an optimal contract are two-fold. The first concerns how the manager is to identify the most relevant variables required for a contract. The second concerns how a contract can be designed that can deliver the project objectives in a more 'cost effective' manner (Davidson et al, 2009). The creation of an optimal contract is further challenged by the non-visible drivers (such as risk management, human resource management, and anticipated developments in technology) which can be manifest only during the execution of the work. All these variables need to be planned and managed throughout the project.

There is a gap in the published body of knowledge in this area regarding how the variables are to be identified and selected to be included in a contract. Hartman (2003) and Construction Industry Institute (CII) recognised these gaps. Most literature in the field appears to concentrate only on a few variables to be considered for the selection of contracting strategy. Also, different authors use different approaches in identifying the most relevant factors to be considered. For example, Davidson et al (2009) offer a decision tree to differentiate different contracting strategies, based on criteria including scope, availability of owners' personnel, and the experience of the corporation in the work to be undertaken. Camp (1996) identified corporate policy, an assessment of project and investment risks, and a cost analysis as major factors to be taken into consideration for a particular project. Ng and Skitmore (2002) identified world markets, skill availability, supplier and contractor availability and integrity, environmental, local content, and local issues. In all of these, it is not certain which of

the variables are the 'most relevant' or indeed what variables the project managers should be using. Hence, it has remained a challenge to define the term 'optimal contract'.

As already discussed, visible and non-visible variables are required to be taken into consideration in the formation of a cost-effective contract strategy. The body of literature pointed out that identifying all the variables and using them in the formation of a contract is a challenge that cannot be achieved. It is equally a challenge to select the most relevant variables. If indeed, a contract cannot be complete, then how does a project manager select the most relevant variables to produce an 'optimal' contract? What factors are taken into consideration? This remains a major challenge, as there is little or no guidance in literature or in the very rigid processes and procedures available to project managers.

The next logical step for this research is to further examine the impact of theory of contracts in the identification of variables for contract strategy formation.

Theory of Adverse Selection – impact on identifying the variables for Contract formation

The challenges and issues of identifying variables to be used for the selection of a contract are recognised in the theory of contract in the adverse selection model (Salanie, 2005, p.11). This states that only one party possesses private information. This is not exactly the case in the real world (Salanie, 2005) where in most two-party relationships both parties have their share of private information. This private information may contain the non-visible variables which contribute to establishing a complete or optimal contract. Hence, there is the added challenge of asking the agent to reveal its characteristics. In these situations, the characteristics of the agent are imperfectly observed. For the principal (owner) to attempt to get the agent (contractor) to reveal his true type is typically very difficult or even impossible (Salanie, 2005).

The reasons given for the difficulties of the agent to reveal his identity include fear of incurring too high social distortion, in which the form loses the respect of significant stakeholders in society (Salanie, 2005). For example, many firms have their operations regulated by Government. The firm has more information on its cost and productivity than does the regulator. In this case, 'the firm will try to manipulate the way that it discloses information to the regulator so as to increase its profit' (Salanie, 2005, p. 43). Therefore, it is in the regulator's interest to do everything possible to make the firm reveal its correct figures so as to take proper decisions (Stiglitz & Weiss, 1981).

Given the above situation where the information available to make a decision cannot be relied upon, the owner has several options:

(i) Seek 'valued or truthful' information in order to be able to make quality decisions. The price that the principal is willing to pay in order to 'induce the agent to reveal his type' is called informational rent (Salanie, 2005). This is also referred to as countervailing incentives. Countervailing incentives exist when the agent has an incentive to either understate or overstate his private information for some of its activities. The realisation by the agent of its private information can lead to distorted performance both above and below efficient levels. This inefficiency increases the agent's rents (Salanie, 2005). Therefore, it is in the interest of the principal to create countervailing incentives to reduce the inefficiencies of having to deal with hidden information involved in adverse selection model. This approach is 'encouraged'. Salanie stressed that the trade-off to solve the adverse selection issues is to give the agent 'enough incentives without increasing his rent too much' (Salanie, 2005). In the real world, the definition of incentives and correctly implementing the incentives to achieve the desired objectives or results is also a challenge.

(ii) Another alternative approach is the application of the allocation rule in a deterministic situation. This is in a case where the principal does not know the agent's preference. The principal can request from the agent their demand functions, use the information to compute the corresponding equilibrium, and allocate to each agent their equilibrium allocation. By doing this rebalancing act, it is possible for the principal to

state upfront certain conditions to be used for the resource allocation and how it will be financed. Therefore, the agent can only state their preference and signify their willingness to pay based on the given criteria (Salanie, 2005).

While an agent may provide even negative information about himself or herself, it is more common for the principal to have to discover the negative information that may constitute a risk. This is one of the major challenges to the adverse selection model of contract theory. Salanie summed up the challenges by discussing the mechanisms that are direct and truthful – so that the agent finds it optimal to announce the true value of the information (Salanie, 2005). This is the revelation principle. One unique distinguishing features of the revelation principle is that the principal offers the agent a menu of contracts designed to meet the agent's type that must 'be truthful at equilibrium' (Salanie, 2005). This approach in the real world gives the agent the alternatives from which to choose. The revelation principle deals generally with one-shot contract relationship. It does not generally apply in a repeated long-term contract arrangement (Bolton & Dewatripont, 2004).

The Revelation principle is challenged by the fact that the agent may not know his type until after signing the contract. Salanie also acknowledged that it is reasonable to assume that the agent knows his type only after the contract is signed before execution (Salanie, 2005). In the standard model of the adverse selection, the principal and agent exchange a vector of goods and monetary transfers. The agent private information has a characteristic which is known only when the contract is signed. In this model, the agent chooses the contracts designed for him by the principal. His preference and decision in making this choice is based on the menu of contracts which provides him 'a utility level as large as his reservation utility'. It is natural to expect that the agent will continue to discover other characteristics of the principal which was not apparent at the time of signing the contract. After all, the menu of contracts allocated by the principal are those that 'maximise the principal's expected utility' (Salanie, 2005).

Based on Salanie's conclusions, it is likely that information is asymmetric when the contract is signed. This is the 'hidden information model' where information is

asymmetric ex ante (i.e. result of actions can only be forecasted) and asymmetric ex post (results of actions cannot be forecasted). One distinguishing fact about a standard model is that the contract makes profits or losses regardless of the type of agent who buys it (Salanie, 2005).

Ex ante effort refers to effort by the owner to assess/forecast the characteristics of the contractor. This forecast is required to be as precise as much as possible when planning to ensure that the correct resources are available as and when needed. An adverse (negative) selection problem occurs when the contractor has ex ante (future) information which the owner does not have (Berends, 2007) but requires to make a very good judgment.

Given the above analysis, it can be seen that the PM faces a major challenge to obtain all the information required to put together an optimal contract, yet may feel obliged to consider only those variables prescribed by its organisation. This result of this activity leaves another major gap in how these variables are managed or ranked in order of priority to form a contract.

Application of the Adverse Selection theory in the oil and gas industry

Experience has shown that some contractors make false representation of information about their capabilities in order to win a contract (Hartman, 2003). For instance, during bidding, the contractor may provide names of key personnel with their positions in the contractor's organisations. On award of contract, less qualified people are substituted into the project team. This result defeats one of the objectives of contracting out work which is because the owners do not have resources or expertise in-house to do work, increase productivity, reduced costs, and reduce management effort (Bertolini et al, 2004; Hartman, 2003). This further increases the risk exposure for the owner, especially if they do not have the required manpower to cover the shortfall (Howard & Bell, 1997).

Another example is the owner's ability to carry out background checks on the credit worthiness and financial strength of the contractors. Most corporations rely on credit checks using agents such as Dunn and Bradstreet. Others may require a bank guarantee letter. This makes it a massive challenge to create general equilibrium models that could account for informational asymmetries presented (Salanie, 2005). The current practice of most corporations to maintain information database of all their contractors and suppliers is good. However, the information contained in such databases can be only as good as the data supplied by the contractors.

One of the key challenges of selecting a value-for-money contractor is the lack of information to properly identify and evaluate the contractor. According to Hartman (2003), it is not possible to select value-for-money contractors under the current practices where most corporations have their own procurement policy which also covers tendering. One of the major rules used by the procurement department which may not be favourable to the selection process is that contract can be awarded only to the lowest bidder. The commercially qualified bidder has to be the lowest in terms of money. Nevertheless, it is still possible that the most technically qualified and lowest bidder made a mistake in its estimation of the work. This disability to recover full information again throws the whole process of selection of the contractor into question. Hence there occur change orders and adverse relationships (Berends, 2007; Zaghloul & Hartman, 2005).

The theory of the auction model throws more light on the understanding of the mind of the contractor when bidding for projects. Bidders generally submit a bid which is lower than their valuation of the goods but the bid is slightly higher than that of their competitor (Salanie, 2005). This deliberate lowering of the cost in order to win the contract will definitely result in unnecessary variations during the project execution. This practice is very common with poor performing contractors who are desperate to get work. They rely heavily on change orders (variations) to make profit. In an organisational environment where project managers do not accept variations, then the project is off to a troubled start, especially when the environment undergoes change that requires inevitable variations to a contract.

As a result of the misrepresentation or lack of trust, there may be unnecessary tension between the owner and contractors. This uneasiness makes it impossible to create a collaborative working environment during the contract execution. Many contractual arrangements between construction clients and contractors are confrontational, reflecting considerable mistrust and leading to increases in contractors' premium to avert significant risk levels (Zaghloul & Hartman, 2005).The significance of trust in the strategic partnering relationship has received overdue attention in recent research (Lendrum, 2000).

Another aspect of the Adverse Selection model is that the agents learn about their private information after the contract is signed and before execution of the contracts. Since their decision was based on the initial options available to them and their preferences at the time (Salanie, 2005), there is a high tendency that they may find some more 'valued' information before and during the execution of the work which may require them to ask for a change or renegotiations. Principals therefore need to be open and prepared for variations and the management of such changes. The concept of long-term commitment and renegotiation can be better managed so as to achieve a 'renegotiation-proofness principle' leading to an efficient contract (Dewatripont, 1988). Unlike the revelation principle which deals with static or one-shot contracts, the renegotiation proofness principle addresses issues of repeated long term contracts. It provides options to address optimisation problems in long-term contracts where familiar incentive constraints of one-shot contract are replaced by tighter renegotiation-proofness constraints which enable contracting parties to always commit to or enforce long term contractual agreements (Bolton & Dewatripont, 2004, p. 365). According to Bolton and Dewatripont (2004), the renegotiation-proofness principle provides a basis to deal with the increasing complexities and optimal contracting problems in long-term contracts if the contracting parties decide to renegotiate the contracts along the way.

One of the major disadvantages of misrepresentation of work is the numerous change orders and claims. This is the case sometimes because the contractor doesn't understand the scope of the work which may result in under bidding. In a lump sum

contract, this lack of understanding of the complete scope of work will be a major problem for both owners and contractor. Berends and Dhillon (2004) confirmed that the asymmetric information does not exist in a cost price fee contract because both parties are fully informed. The contractor incentive to pursue change orders and claims are weaker than under a Lump Sum Fixed Price (LSFP). This is one of the main reasons why a lump sum contract should not be selected unless the scope is firm and complete.

In conclusion, it is accepted that executed contracts may still contain distortion (Beaudry & Poitevin, 1993) and that a contract is never complete (Salanie, 2005; Tirole, 1999). A contract may be incomplete because contracts can take into account only those variables that can easily be verified by a court or a limited number of variables that may be most relevant (Salanie, 2005). One key reason for selecting only variables that are most relevant is to reduce the cost of preparing the contracts (Tirole, 1999; Salanie, 2005). Hartman (1994, 2003) agrees with Salanie's view that since contracting strategy decisions are affected by business drivers, it is imperative that all relevant drivers must be completely identified and used in the selection of strategy. In both cases, reference is made to all relevant or most relevant drivers (Hartman, 1994). Hence some variations and renegotiation should be expected. Therefore, the next step for this research is to examine how to select the most relevant variables.

2.2 SELECTION OF CONTRACT STRATEGY DRIVERS

This discussion confirms that it is not possible for the owner to fully identify all the drivers for the formation of a contract strategy. Hence, project managers use variables prescribed by their corporation in the selection of a contract. It is also concluded that the variables cannot be complete. The next challenge is how are the variables selected and managed i.e. are these variables evaluated and ranked in terms of priorities?

There are several different groups of stakeholders in oil and gas industry:

(i) Environmental groups and indigenous populations.
(ii) Government, National Oil Companies (NOC).
(iii) Joint Ventures (JVs).

(iv) International Oil Companies (e.g. Shell, Exxon Mobil, British Petroleum, Total, Chevron and others).

(v) The lenders/financial institutions, and Insurance companies.

The typical drivers of the stakeholders are as follows:

(i) Government/National Oil Company: Drivers – Revenue, Sustainable development, local content development, and environment.

(ii) IOC and Joint Ventures: Drivers – Profit/Revenue, increase reserve inventory, sustain optimal production level, business opportunity, reliability of fuel and feedstock supplies, high degree of reliability and availability of production facilities, safety, and environment (Mian, 2002).

(iii) Lenders/Financial institution: Drivers - Profit and timely repayment of debt). These drivers can be grouped into three main beneficial areas, namely Social, Economic and environmental.

Different stakeholders have varied interests, which can be described as drivers (of their thinking and behaviour). All of these drivers are critical in the definition of the objective of the business and the project; hence the significance of aligning the objectives in the selection of a contractor. In the review of literature relating to the definition and selection of contracting strategy, it is not possible to ignore the major research study carried out by the Construction Industry Institute (CII) (CII-RS165-2, 2003). The studies aimed to provide best practices and provide guidelines for the identification and selection of project delivery and contracting strategy (PDCS). The variables identified for the selection of PDCS are cost, schedule, minimum delay, minimum expenditure rate, risks, procurement, change/variation management, owner team, project confidentiality, familiarisation with project, scope, project complexity and innovation. The Construction Industry Institute studies also identified the first step in the process of developing contracting strategy as the definition of the business objective for the investment and aligning these objectives with the project objectives (CII-RS165-2, 2003). The major challenge is ‘how are the objectives defined and aligned?

There are no set guidelines for defining and communicating project objectives. A properly defined objective and communication process is one that has a top-down approach with feedback loop to ensure reviews and continued clarification of the objectives (CII-RS165-2, 2003). This implies that the overall business objectives and drivers should be translated into project objectives and subsequent definition of Contractors' (Suppliers and Designers) objectives should be based on the project objectives (CII-RS165-2, 2003). In reality, this is a challenge. The contractors usually have their own objectives which are taken from their organisation's overall objectives. Ironically, this may become the starting point for problems in projects.

Consequently, the nonaligned objectives will affect the contracting strategy selected. In particular, the engagement and selection of contractor will be based on misrepresented information. Notably, the contractor/owner relationships will be adversary and counterproductive (Rose & Manley, 2005). The non-alignment of the owners' objectives with those of the contractors has been explained as a direct consequent of the asymmetric information received from contractors. Asymmetric information usually results in the selection of the wrong alternatives or moral hazard. Moral hazard or potential moral hazard may be said to exist in a situation in which the contractor has more accurate information than the owner or where the objectives of the parties differ (Salanie, 2005).

An example of asymmetric information is where the different objectives of contractor, owners or shareholders and managers, are not aligned. The principal can observe the actions of the agent and can order him to choose the efficient action, and choose the wages that achieve the optimal risk sharing. This situation is referred to by Salanie as 'first best' situation (Salanie, 2005).

Optimal risk sharing implies that the principal perfectly insures the agent by given him constant wages and by bearing all risks involved in their common activities (Salanie, 2005). In this case, some form of evaluation and allocation of the risks is carried out. The owner puts together a contract as he deems fit with all the risks built in. The agent accepts the contract knowing that the allocated risks are all paid for in the contract. In

reality, this is not always the case. In the current practices of contract formation in oil and gas corporations, the owner chooses a certain type of contract in order to avoid owning and therefore having to manage the risks involved in the work.

The theory of Moral Hazard model also introduces the need for the principal and agent to manage their relationship. Using Salanie's "two-action, two-outcome model", the interdependence of both parties is relevant after the contract is signed. The agent can choose between working and not working. The principal can observe whether the agent succeeds or fail at his task. The principal gets a pay-off when the agent succeeds. Otherwise, the principal payoff in the case of failure is poor. Where the principal wants the agent to work, he must give the agent wages *plus* incentive and in case of failure, wages *minus* incentive (Salanie, 2005).

Managing the relationship between agent and principal where the objectives are not aligned is a challenge**.** The standard model of the moral hazard theory describes a situation where the agent must choose between multiple possible actions which produce different outcomes depending on the chosen action. Salanie (2005) refers to the stochastic relationship between actions and outcomes as a 'technology'. Since the only publicly observed variable is the outcome, contracts must take the form of wages that depend on the outcome. So the principal will pay a wage if he observes an outcome. Therefore, it is advisable for the principal to choose the contract that maximises his expected utility but takes into account his contract with the agent (Salanie, 2005). There is no doubt that the agent faces a very high risk of being exploited by the contracts that he chooses to sign given that the principal's objective is to maximise his expected utility.

When a contract is signed, the success of the principal depends on the agent's succeeding in delivering the work (Salanie, 2005). This deliverable further emphasises the need for trust in relationships in the execution of the contract. It also emphasises the need to align objectives to ensure a win-win situation for both contractor and owner. To achieve this common goal, Salanie identified two main properties of optimal

contract that must be implemented to get the desired results. These are optimal wages schedule and optimal incentive contract**.** These properties are defined as follows:

(i) The term 'optimal wage schedule' implies that the wage should be higher when the surplus to be shared is higher. Where there are only two factors (failure or success), then the agent should receive a basic wage and a bonus proportional to the increase in the surplus when he succeeds. Therefore the optimal wage should depend on all signals that may bring information on all actions chosen by the agent (Salanie, 2005).

(ii) The term 'optimal incentive contract' implies that optimal contract over a whole period gives the agent a bonus that depends linearly on the number of periods in which the outcome increased.

To summarise this section, the need to have well designed drivers for a project cannot be overemphasised. The drivers enable the owner to develop an effective payment terms, identify the behaviour to incentivise, and the type of contractors required to do the work. Hence the recommendation is to tailor the tender package to attract a value-for-money contractor. The term 'value-for-money contractor' refers to getting the best qualified contractor to do a piece of work at a reasonable and acceptable) cost. A reasonable and acceptable cost is a cost that is within company estimates. According to Hartman, it is not possible to select value-for-money contractors under the current practices where most corporations have their own policy (Hartman, 2003).

Application of the theory of Moral Hazard in the oil and gas industry

The theory of moral hazard provides an insight into how the different contracting types are selected and implemented in practice.

Contracts tend to be either Lump sum or Reimbursable, or derivatives of these two main types. Selecting between a Lump Sum contract and Reimbursable type contract should be one of the early strategic decisions faced by the management team (Camps, 1996). It should be done very early in the project lifecycle (Davidson et al, 2009), so that the contract cost phasing can be made an integral part of the bidding and

contracting process (Berends & Dhillon, 2004). The various combinations of the contracting types and the associated compensation systems are reviewed below. The boundaries between both forms of contracting strategy are almost blurred. According to Berends (2000) in practice, lump sum and reimbursable type of contracts are not used 'plain' but in a form which contains bonus/malus (incentives) arrangements. Hence in the current world contracting market there seems to be a noticeable shift to reimbursable contracting (Berends, 2000).

A. Lump Sum Fixed Price contract

In a lump sum fixed price (LSFP), the contractor is paid a specified contract sum for executing the work scope. The contractor carries the project risks. The risks are considered inbuilt into the package. There are no efforts made to allocate the risks (Howard & Bell, 1997). There may be some identification but no consideration is given to the contractor's ability to effectively manage the risks (Ward, 1999). In reality, the contractor ensures that he charges extra on top of the total contract cost, to repay him for carrying these risks. In the latest information available from senior managers in one of the oil and gas corporation, a contractor on one of the LNG projects in Africa, the contractor charged over 87% extra on the total installed costs of the project for the risks. This extra cost was demanded because regardless of difficulties and troubles, the satisfactory completion of the project remains the obligation of the contractor (Howard & Bell, 1997).

The main disadvantage of this form of contract is the lack of owner's control over and influence on the works. The principal can only observe the outcome of the action (Salanie, 2005). The contractor's choice of suppliers or equipment is sometimes out of the controls of the owner as long as the equipment is fit for purpose. Example: the owner may suggest hiring higher capacity installation equipment with lower weather downtime, but the contractor can actually go for the cheapest equipment he could get. He is therefore at liberty to pursue its own objective to maximise profit from the high wages that he is paid by the principal.

The main advantage of this type of contract is that the contract costs are fixed and easy to manage. The fact that cost is fixed is contentious. Camps (1996) states that owners cost can increase and the contractors profit can also increase if the elements of risks in the lump sum contract are not properly allocated. The key advantage of the lump sum contract is the fact that the owner's team is small. Thus in the real world, Salanie's moral hazard model, which states that the principal can only observe the outcome of the action of the agent but cannot force the agent to take Pareto-optimal actions, is indeed the case.

B. Reimbursable Contracts

Reimbursable contracts are mostly used with incentives as follows.

(i) Cost-plus-incentive-fee (CPIF) contract – As the name indicates, the owner reimburses the contractor for all the costs associated with the project work scope. The owner carries the project cost risks. Performance incentives are used to get the contractor to deliver the project on time and to schedule. The driver in this case is not cost but time and schedule – not enough time to put all of the pieces in place (Hartman, 2003). The contract cost is not known until the end of the work. Hence contractor profit is equal to target profit plus share of the under run (Howard & Bell, 1997). This contracting type requires a large owner's team to verify the work and to manage the contract.

(ii) Cost-plus-fixed fee (CPFF) contract – This is also a form of reimbursable contract. The difference between the CPIF and this type of contract (CPFF) is that the owner pays the contractor a fixed fee (profit). The contractor profit does not vary with the actual cost of completing the work (Howard & Bell, 1997).

(iii) Fixed Price Incentive (FPI) contract – This is another form of reimbursable contract. The difference between CPIF and FPI is that in FPI contract the contractor assumes the financial responsibility for costs overruns beyond some ceiling or under

runs below some ceiling. Whereas in CPIF, the owner assumes responsibilities for overruns beyond some ceiling or under runs below some ceiling (Scherer, 1964).

In the real world, the practice of reimbursable contract is in accordance with the moral hazard (first best situation) in which the principal can observe the action of the agent and can order him to choose the efficient action (Salanie, 2005). However, most Corporations do not have adequate numbers of personnel or personnel with proper experience to supervise reimbursable contracts (Howard & Bell, 1997). There is a general preference to have the contractor manage the project to insure that there is adequate productivity rather than being involved in problem identification and resolution.

2.3 RISK IDENTIFICATION AND ALLOCATION

The theory of moral hazard also recommends optimal risk sharing (Salanie, 2005). In order to achieve optimal risk sharing, it is necessary to determine the relative significance of different sources of risk to guide the risk management effort and to ensure that the project remains cost effective. Corporations seems to be doing well in the identification of upside (opportunities) risks. The main challenges are in the identification of downside risks which could have greater impact in the delivery of the projects (Davidson et al, 2009). These downside risks are 'uncertainty and ambiguity' which represents 'shadow conversations' (Walker & Lloyd-Walker, 2014, p.239). Walker and Lloyd-Walker stressed that the 'the broader conversation should consider both known and unknown risk and their mitigation' (Walker & Lloyd-Walker, 2014, p.239). The difference between risks and uncertainty is in the practical management of the risk where risks are assigned probability but it is not possible to assign probability to uncertainties (Kerzner, 2001).

Based on literature, to effectively identify and manage risks – 'business processes and practices' needs to be established and strengthened (Hartman, 2003, p.230) and 'systems need to be designed' (Walker & Lloyd-Walker, 2014, p.239). This approach establishes a balance between cost of managing risks and the utility gained (Hartman, 2003, p.239).

In real life, determining the sources of risks and hence rank the risk is currently a problem for risk management efforts, as project managers frequently do not have the capability, nor the willingness to invest the time in the proper identification and prioritising of risks, and in their allocation to the party that can better manage them (Ward 1999). Thus, some owners favour lump sum fixed price contracts in order to transfer the risk to their contractors, to avoid major cost overrun, and to reduce the size and the required capability of their management team. This is the traditional contracting strategy which may lead to economic inefficiency in which the cost risks are carried by a party that is not in the position to bear the risks in cases where the risks eventuate, or where information asymmetry exists during the project lifecycle (Howard & Bell, 1997). The fact that organisations do not compel project managers to put considerable effort into risk identification and management could be a reflection of the fact that risk management is strongly influenced by organisational attitudes to risk (Davidson et al, 2009).

Clearly, lack of easy and simplified risks identification process/methods has resulted in the lack of proper identification of risks in projects (Construction Industry Institute, 2003). The lack of identification of risks has a direct effect on the contract strategy selected by the owner. A lump sum contract may seem to have passed on the risks to the contractor but in actual fact the contractor does not have the resources and capabilities to assess and bear the risks involved (Camps, 1996). Camps (1996) further states that on top of the extra cost which owners pay for added sense of security, contractors can increase their profit margin and owners' costs in more subtle ways that they do not show up directly in project in the contract price – this activity involves the clever manipulation and acceleration of the payment schedule to generate substantial surplus funds. While this practice increases the contractors' profit, it also increases the owners' cost and risks (Camps, 1996). A contract which does not fully consider the risks and the ability of the Contractor/allocated party to manage them is not an effective contract (Hartman, 2003). Therefore, selection of a contracting strategy should be based on more than allocation of risks as part of risk management.

Camps also expressed similar concern as those expressed by Hartman (2003) over the wrong choice of a contracting strategy. He added that the wrong approach to selecting a contracting strategy can increase cost during project financing negotiations. Therefore, it is not a guarantee where lump sum contracting strategy has been used that the contractor can deliver the project irrespective of problems or issues. Lump Sum contractors can go default or go broke, and the owner or investor may not have adequate contingencies in place for this event (Camps, 1996).

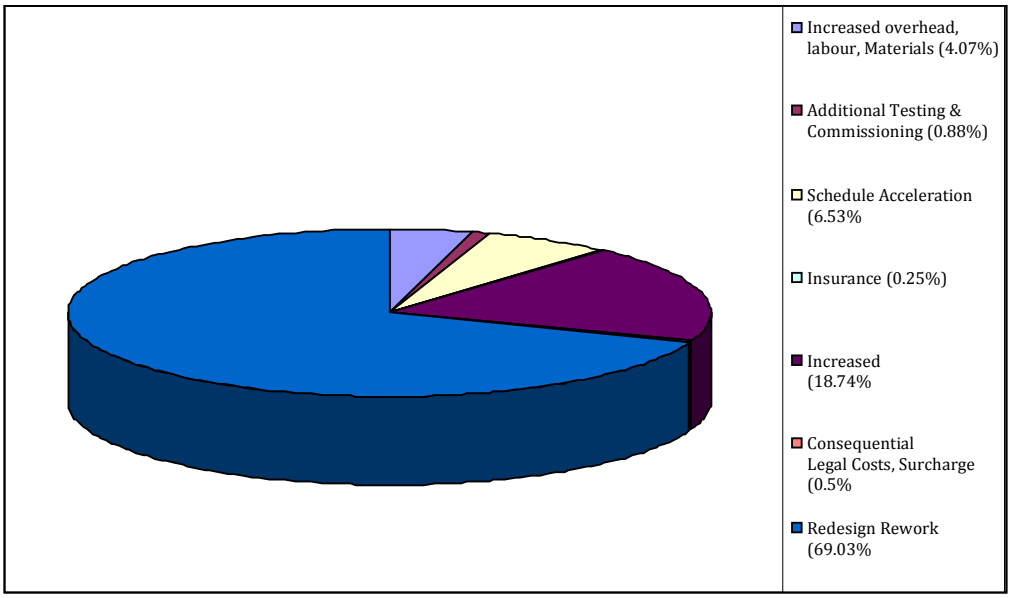
Another crucial aspect to this argument is that where owners choose to shift the risks to the primary contractor, the primary contractors also pushes the risks down to lower-tier parties in the contracting arrangements. According to the findings of the Construction Industry Institute (CII) research study, the consequences of these actions is that (i) the parties with the least amount of control and influence over many of the risk-producing factors and decisions often carry the majority of the construction risks burden, and (ii) in nearly 20% of the overall impact resulted to contractors increasing their contingencies in response to inappropriate risk shifting by the owner (Construction Industry Institute, 2006b).

The term 'inappropriate risk allocation' refers to the practice of allocating risks 'without separately considering which party may be in the optimum position to evaluate, control and bear the cost, or benefit from the assumption of the risk' (Construction Industry Institute, 2006b). The proper allocation of risks between the owner and the main contractor and ensures that only parties that can manage them are assigned the risks is a crucial element in developing the contracting strategy (Boussabaine, 2001). The approach whereby the Principal does not perfectly insures the agent by given him constant wages and by bearing all risks is not an optimal risk sharing (Salanie, 2005).

Based on the Construction Industry Institute (2006b) case studies of estimated 17 projects of approximately 1.2 billion dollars; the cumulative financial impact of inappropriate allocation of risks amounted to approximately $159 million i.e. over 14%

of the construction budget (Construction Industry Institute, 2006b). The financial breakdown is depicted below:

Figure 2.3: Financial Consequences of Inappropriate allocated risks



Source: Adapted from CII research study (2006b) for this research.

Below is a consolidated extract of examples of major risks which projects do not properly allocate. This extract is taken from CII Research Study (2006b).

No Damages for Delay, Consequential Damages, Indemnity, Ambiguous Acceptance Criteria, New or Unfamiliar Technology, Force Majeure, Schedule Acceleration, Cumulative Impact of change orders, Owner mandated subcontractors, Insurance Allocation, Differing Site Conditions, Design Responsibility, Waiver of Claims, and Standard of Care. CII study refers to them as "14 Hot-button risks" (Construction Industry Institute, 2006b). The details including description of each of the risks are contained in appendix A of this thesis.

In conclusion, it should be noted that one of the main challenges of risks identification in the real world is that corporations do not have trusted and very reliable ways of checking the contractor's risk owning and managing capacity. Currently corporations' uses a combination of bank guarantees and Dunn and Bradstreet reports, using market intelligence group to see if a company has had problems with contracts in the recent past and their financial strength. For long-haul projects, where risks changes with time, these methods of checking is surely not enough. A crucial element in developing the contracting strategy and tactics is the allocation of risks between the owner and the main contractor and ensuring that only parties that can manage them are assigned the risks (Boussabaine, 2001).

Theory of Incomplete Contract

This research has already established that not all variables are considered in the formation of contracts. It was also established that only the most relevant variables are selected. Hence it was concluded that contracts cannot be complete. This premise was studied using models that were developed in a situation where one party has more or better information than the other (asymmetric information). The basic assumption is that once the contract is signed all parties made their decisions based on their preference and the terms of the contract and then they go their separate ways (Salanie, 2005).

Next, this research will examine the theory of incomplete contract to further investigate the impact of incomplete contracts on the establishment of an optimal (cost effective) contract. The theory of incomplete contract is very recent and can be classified as maturing (Salanie, 2005). Hence the results from the work by experts (Maskin & Tirole, 1992; Segal, 1999; Hart & Tirole, 1988) in this area challenge 'common view' about incomplete contracting (Salanie, 2005) since the foundation of incomplete contract is not well-established (Tirole, 1999).

For the purpose of this research, it is best to summarise the shared views of project managers views to provide some understanding of the properties, or at least the definition, of incomplete contract. Salanie (2005) provided two main reasons why a

contract may be incomplete when he stated that a contract only takes into account variables that can be easily verified by a court or a limited number of variables that may be the most relevant. Tirole grouped these variables into two, 'rationality' and 'transaction costs' but agrees that there is no clear definition of incomplete contract in literature (Tirole, 1999).

Salanie (2005) and Tirole (1999) both agreed that the cost of writing a contract is one of the main reasons for using limited but most relevant variables. Tirole (1999) also opined that the judges are not doing enough to read the contracts in order to verify the evidence (Tirole, 1999). In short, not all variables are included in contracts to avoid ambiguities. Therefore, it cannot be assumed that all contingencies that may affect the contractual relationships in a contract, throughout the duration of the contract, have been taken into account. Hence, in the real world, a contract cannot be guaranteed to be a 'complete contract' (Salanie, 2005). Tirole specifically said that 'actual contracts are or appear quite incomplete' (Tirole, 1999).

In real world, contracts appear to have a rather simple shape (often linear) and depend on a small number of variables only. Salanie (2005) suggested that contract should be 'a complex non-linear function of an a priori fairly large number of variables' (Salanie, 2005). However, Holmstrom-Milgrom (1991) disagrees with Salanie, suggesting that simple linear contracts may be more robust than more complex contracts which can be achieved if the agent is left with more freedom (Holmstrom & Milgrom, 1991).

Based on the conclusions drawn from Salanie (2005), Maskin and Tirole (1992) the concept of complete contract is not a common practicable possibility. It is not possible for all the required variables to be included in a contract. There is gap in the body of knowledge on what should be considered as 'small number of variables', 'fairly large number of variables', 'simple linear contract', and 'complex contracts'. But it is very clear that PMs cannot form a complete contract. Therefore, what is required is a contract which is optimal and provides the flexibility to be used in any given scenario.

2.4 CHARACTERISTICS OF PERSONS MAKING CONTRACT STRATEGY DECISIONS

The decisions required to be made in relations to selecting a contracting strategy are complex and difficult. They involve several competing objectives and drivers. These decisions are 'affected by the perceived level of complexity of the environment within which the project is developed and delivered' (Walker & Lloyd-Walker, 2014, p.12). For the avoidance of doubt, the main characteristics of complexity is uncertainty, ambiguity and decreasing levels of trust of people in their relationships or behaviours that suggest unexpected emergence of events that negate held assumptions about the situation (Remington, 2011, chapter 1 cited in Walker & Lloyd-Walker, 2014, p.64).

There is little or no guidance for project managers on how to arrive at these decisions. In most cases, contract selection decisions are made in accordance with the prescriptive policies of corporations. Furthermore, the current approach of getting experienced engineers into a room for a workshop – a method referred to by Forman as BOGSAT (a bunch of old guys/gals sitting around talking) – is not helping the contracting strategy selection process. These sessions are dominated by the leader and those who shouts the loudest. There is hardly any analysis or facilitation (Forman & Selly, 2001). Yet, most corporations relies on these 'old guys/gals' for their corporate policies which drives the formation of contract strategy as well as processes and procedures.

According to Walker & Lloyd-Walker (2014) 'Complexity involves something beyond quantitative factors (numbers of people, social links, scope and scale etc.) to include qualitative factors such as the nature of influence and ability to recognise and cope with it' (Walker & Lloyd-Walker, 2014, p. 64). Hence project managers require sound experience and expertise to deal with these level of uncertainties, ambiguity and diminishing trust. Trust is seen by Hartman (2003) as the most challenging of all the competencies. Hartman sees the problem with trust as 'ethereal and so hard to measure and audit – at least until it is too late' (Hartman, 2003, p.231). Hartman (2003) warned that trust should be used with minimal risks or exposure based on conditions (openness, flexibility, and fairness) as to the extent that another party can be trusted.

The availability of in-house expertise with the right competencies in all locations where capital project is executed is a major problem in the oil and gas industry and crucial factors to be taking into consideration for selecting a contractor. This situation is not helped by the ageing workforce and retirement of experienced engineers (Mandil, 2005). As seen from the foregoing analysis, there are a lot of critical decisions to be made in the selection of a contracting strategy. It is therefore required that those who make these decisions should be very experienced, in addition to well-informed.

One of the main challenges for this research is identifying the characteristics of people that are formulating contract strategies and hence making decisions on which variables to select. Although there are severe limitations in the availability of literature on this subject, the Project Management competency development framework (PMCD) by Project management institute and Snowden Cynefin framework provides a foundation for this study. This research will also draw on the experience of the researcher as well as data collected for this research to establish the characteristics. These collections of information also form part of the contribution of this research to the body of knowledge on this topic.

The three dimensions of the PMCD framework are (i) Knowledge (what a PM knows about applying processes, tools, and techniques), (ii) performance (How a project manager applies), and (iii) personal behaviour (how a project manager behaves when performing activities). These competencies are required to be posed by PMs in order to be recognised as fully competent (PMI, 2007). The Snowden *Cynefin* framework further characterised the domains of knowledge as *known, knowable, complex and chaotic* (Kurtz and Snowden, 2003, p.468). Known knowledge refers to best practice in tame situations. *Knowable* knowledge is provided by subject matter experts / technical authorities based on analysis of tame or messy situations and guide PMs on how to respond from understanding patterns and reducing ambiguity, uncertainty and linkage within and between systems. *Complex* spaces are where patterns are in a state of flux and there is uncertainty about how, why and when changes occur but highly expert people can understand the dynamics of these turbulent patterns. *Chaotic* is the space

where knowledge and thinking must be entrained then used, when and as needed, where assumptions are totally questioned and response to experimentation is rapid and intuitively applied (Walker & Lloyd-Walker, 2014, p.65).

The next step, having examined the PMCD and Cynefin framework is to understand the main business roles, attributes and the experience of personnel that establish or directly contribute to establishing contracts in the oil and gas industry.

Typically, those that get invited to the contract strategy formation are: (i) Supply Chain Executives, (ii) Contract managers, (iii) Project Managers/directors, and (iv) Contract Sponsors. The decisions made by these managers are required to be approved by contracting boards/Decision Executives.

Who are these people and what are their qualifications and experience?

- **Supply Chain Executives** – generally has good experience from a contracting perspective. But not required to be familiar with the particulars of the project.
- **Contract Manager** – Leadership skills, ability to operate under stress, bottom line focus. 10 - 15yrs experience in project engineering / contract management
- **Contract Sponsors** – these are representative of the stakeholders and national oil company. They may not be very experienced in contracting or engineering but represent the interest and views of their stakeholders.
- **Project Manager/Director** – Typically with a degree in an engineering discipline, with a minimum of 10 - 15 years total working experience, but with minimum of 10 years experience in project management in the onshore and/or offshore oil and gas projects. Large Projects usually have Project director, supported by Project Managers. The Project Directors are people with several years of experience in engineering project management.

In most oil and gas corporations, in addition to the general criteria used for the selection of a project manager - proven leadership qualities, a team player in attitude and interpersonal skills, and experience of at least two full project lifecycle in a senior project engineer/senior discipline engineer role is required. It is required that this person must have participated in making key decisions in projects and successfully handed over projects to operations and maintenance.

The above person specification is indeed sufficient to successfully manage a project or make contract strategy decisions. However, as a result of the ageing work force and the progressive retirement of the experienced engineers, most of the project managers do not have the correct historical information and experience to base their judgements. Speaking to a colleague recently, he called these project managers 'MBA Managers'. He was referring to their qualifications in everything but experience. Furthermore, there are cases where despite the fact that personal characteristics and traits of PMS are known, 'management may still select the wrong person' (Kerzner, 2001, p180). The selection of the wrong person (PM) is largely because companies places emphasises on job descriptions (deliverables and expectations) as oppose to competency (specific) skill (Kerzner, 2001, p1063). The wrong selection of PMs adds to the severe limitation in the level of practical experience of people that are developing contracting packages. This lack of experience is reflected in the quality of the papers submitted to approval boards. Using responses to questionnaires, the following are examples of poor quality of contract process input: (i) Poor market intelligence, (ii) Poorly thought out and implemented prequalification using inexperienced personnel, (iii) Poorly written scope of work, instruction to tenderers section, pricing schedule, special terms and conditions, administration instructions, (iv) Not giving tenderers sufficient time to prepare a competent bid, (v) Slow turnaround of tender circulars in response the queries and clarification requests, (vi) Inadequately thought out technical and commercial bid evaluation procedures, and (vii) Lack of normalization.

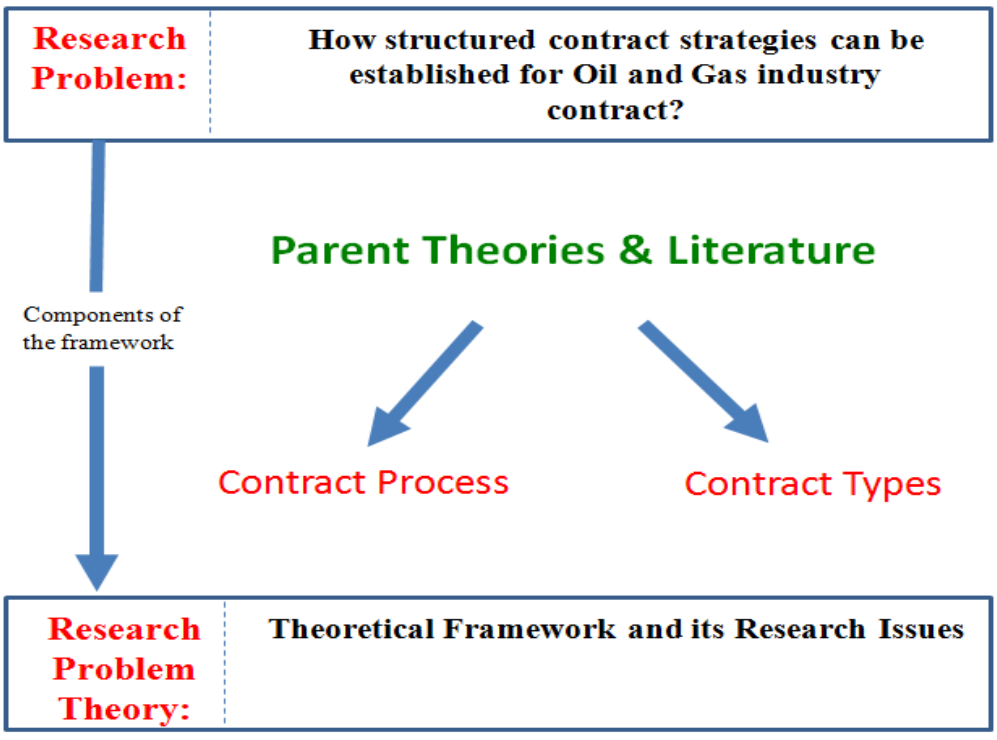
In conclusion, it must be stressed that there are many reports in the research literature on decision making and the decision making techniques. Most of the techniques can be used in the oil and gas industry. However, the characteristics or attributes of key people involved in making contract strategy decisions in oil and gas are not explicitly stated in

literature. Hence there is a scarcity of knowledge and lack of guidance to corporations on how to identity these resources. This research will also contribute to the body of knowledge in this subject.

2.5 THEORETICAL FRAMEWORK AND GAPS IN LITERATURE

Having reviewed the literature and existing theories of contracting and how they have been applied in the oil and gas industry. The next step is to create the theoretical framework to explore the background of the identified problems and to focus the data collection for this research (Huberman & Miles, 1994; Yin, 1994). According to Huberman and Miles (1994), a theoretical framework contains the main issues, construct and variables including their relationships to be studied.

Figure 2.4: Interrelationship between parent theories and contract process and contract types



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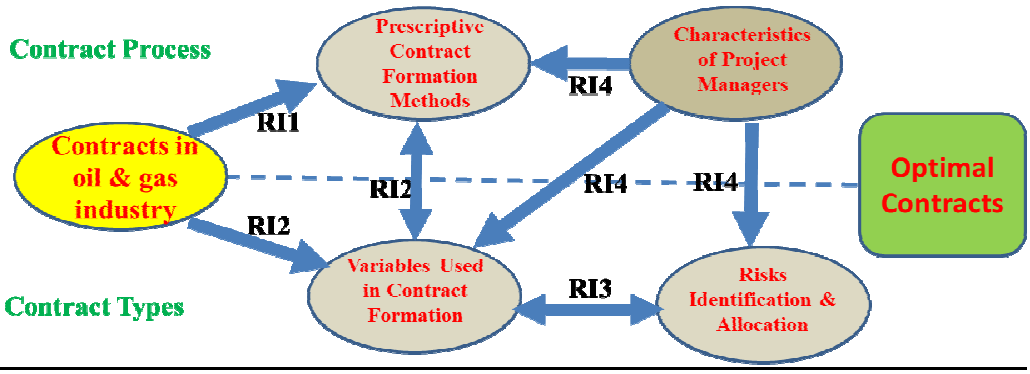
In addition to the above, the details of the theoretical framework showing how each components fits together along with the research issues is shown below.

Figure 2.5: Initial Theoretical Framework of this research



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This research project has two main themes. Namely: the Contract process and Contract types. The main objective of the research is to improve the contract strategies formation process and provide flexible options tailored to different scenarios in the use of any given contract type. Each part of the framework depicted above will be looked at in detail to develop the four research issues. As already highlighted in closing sections of chapter one – four research questions / research issues will be considered in this thesis.

The first part of the framework examines the methods used for the formation of contract strategy. Corporations have current contract strategy formation process which they consider as optimal. This method is very prescriptive. Designed to govern project managers. Little is known about how project managers utilise this prescriptive framework or the operating contingencies that influence how project managers

interpret this prescriptive framework. This uncertain direction is surprising given the value of contracts and considering the huge potential for savings.

Furthermore, in the selection of contracts, not all variables required to formulate the contract are considered or selected. Companies use variables which they consider the most relevant. This followed process is in line with the theory of contracts. Little is known about how these variables are identified, ranked and prioritised prior to the selection of the contracts. The appropriate definition of what is considered as an optimal contract is not known. An understanding of the attributes of what should be considered as optimal contract will provide PMs with the required guidance in the formation of contracts.

Project managers are faced with the decisions to select the variables using their limited knowledge of contracts. There is increasing pressure on PMs to deliver a project on time, on budget and quality. Projects are executed in very complex environment with sophisticated technologies. These complexities, coupled with the progressive ageing of experienced workforce makes it difficult for organisation to rely on the experience of their workforce to supervise or manage the execution of the appropriate contracts. Hence, organisations are prepared to choose certain form of contracts without a detailed identification of the risks and allocation of the risks to the party that is best suited to manage the risks.

Another related concern is that little is known about the characteristics of the contract strategy formulation team and the decision executives. Different corporations use personnel with varied levels of experience in preparing contracts and also making contract selection decisions. The quality of the contract strategies prepared by these personnel is judged to be substandard and full of rework. Surprisingly, there is a huge gap in the body of knowledge on who should be making contract strategy selection decisions and what their role should be. Currently, PMs are charged with the responsibilities to formulate contracts for their projects.

The final part of the framework concerns how to establish an optimal contract which uses a product of variables and also meets the key attributes of an optimal contract. The main challenge here is to carefully extract the attributes of an optimal contract from theory and the body of knowledge reviewed in this research. Some of the attributes will be studied in detail within the scope of this research. Since the scope of contract is very wide, it is anticipated that some of the attributes will not be studied detail in this research but identified for future research. Based on the literature review, the following attributes of optimal contract has been identified for this study. These attributes and any additional attributes to be confirmed from the data analysis will be examined in detail in subsequent chapters.

Eight attributes of optimal contracts

- Aligned (owner and contractor) objectives
- Value for money contractor
- Quality (valued or truthful) Information
- Trust and Relationship management
- Long term commitment and renegotiation
- Optimal risks sharing
- Optimal wage schedule
- Optimal incentive contract

2.6 RESEARCH ISSUES

The four research issues identified in the framework (Figure 2.5) are driven by an overarching question which aims to establish how structured contract strategies can be established for oil and gas industry. The other four questions are sub questions of the main question. Throughout this study the overarching question will remain critical to establishing optimal contracts in oil and gas industry.

The subject matter of this research is focussed on contracts within the project management environment in the oil and gas industry. Six 'bubbles' have been created in the framework in Figure 2.5. Each bubble contains a subtopic designed using the

established gaps in the body of knowledge. Each bubble is linked with a series of research questions (RI) arranged in a logical sequence aimed to systematically lead to the desired outcome.

The arrow RI1 which is one of the contract process related issues, links the contract process to the study of the methods used in the formulation of contract strategy. The literature shows that there is a gap in the body of knowledge in the formation of contracts. The existing processes are rigid and prescriptive. There are delays in establishing these contracts. It is not known what variables are taking into considerations in the formation of a contract and indeed how these variables are managed. Increasingly, there are copy and paste contracts from previous projects. These contracts are not tailored to the environment in which the project manager operates. Current approach does not deliver optimal contracts (Salanie, 2005).

Hence, the first research issue of this study is:

RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?

The arrow RI2 which is one of the contract type related issues, links the contract process to the study of the variables used in the formation of contracts. It also links to the contract formation method bubble because the variables are used taking into consideration in the formation of contracts. The literature discusses the fact that not all variables are taking into considerations in the formation of a contract. The most relevant variables are considered. Given the rigid and prescriptive processes used in the formation of contracts, the operating contingencies which may influence the selection of a given variable are not known. It is also not known how the project managers interpret this prescriptive framework.

Hence, the next research issue is:

RI2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?

One of the eight (8) attributes of an optimal contracts captured from literature includes optimal risks identification and sharing. To achieve optimal contracts, it is required that as a minimum, all of the eight attributes must of included in the contract. There are no evidence that the current practice of contract formation takes all the attributes into considerations. But one of the main gaps found in literature and practice is that PMs select some types of contracts to enable them pass on the risks to the contractors. This behaviour and subsequent act defeats the objectives of outsourcing.

Risk is one of the major drivers to be considered for the selection of a contracting strategy. RI3 links the risks identification and allocation to the contract variables identification. This area will be studied in detail as part of the contract types. This research is of the opinion that of all other attributes of optimal contract, risk management is the major failing point for PMs. This failing is because the risks are ever changing with new sophisticated technologies, and with projects executed in new frontiers and difficult locations. The methods of identifying the contractor's risk owning capacity and the methods of allocating the risks to the contracting parties are not well defined across the oil and gas industry.

Hence, the research issue:

RI3: What is the impact of identifying each risks element in the respective contract types (Lump sum and reimbursable) and properly allocating the risks regardless of the contract type selected?

The last bubble RI4 aims to study the characteristics of the PMs and those involved in the selection of contracts. The PMs are the major players in making contract strategy related decisions. The literature discusses lack of experience of PMs, lack of qualified contract personnel to give guidance to PMs, and scarcity of owner personnel. But the PM is accountable to establish contracts for his projects. To achieve optimal contracts, critical decisions are required to be made. Furthermore, personnel need to be available to both the contractors and the owner. RI4 links all other bubbles in terms of the

decisions and importance of the role which the PMs play in ensuring quality input and decisions are made in the formation of contracts to achieve optimal contracts. The PM play a crucial role in establishing an optimal contract; yet there is severe gap in literature in understanding the characteristics of the PM coupled with lack of guidance from contract experts to PMs.

Thus, the final research issue is:

RI4: What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

2.7 CHAPTER SUMMARY

The current outsourcing and contracting method(s) do not use the product of consideration of issues such as world markets, company corporate policy and strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction in Capital Projects through proper allocation of risks. The main reasons why these factors are not fully taking into consideration in the selection of appropriate contracting strategies include the lack of understanding of the project drivers and how to fully identify them; the available processes for ranking of the drivers are too prescriptive; the existing risks identification methods are too complex and prescriptive; poor quality information available to make decisions; lack of quality (experienced) decision makers; and lack of a proper decision making methodology and system.

2.8 CHAPTER CONCLUSION

This chapter has examined the literature and theory relating to contracts. From this review, a contextual framework was developed and four research issues defined. The research issues will guide the research process that will bridge the identified gaps relating to the research problems.

The next chapter details the methodology used in this research.

Chapter 3: Methodology

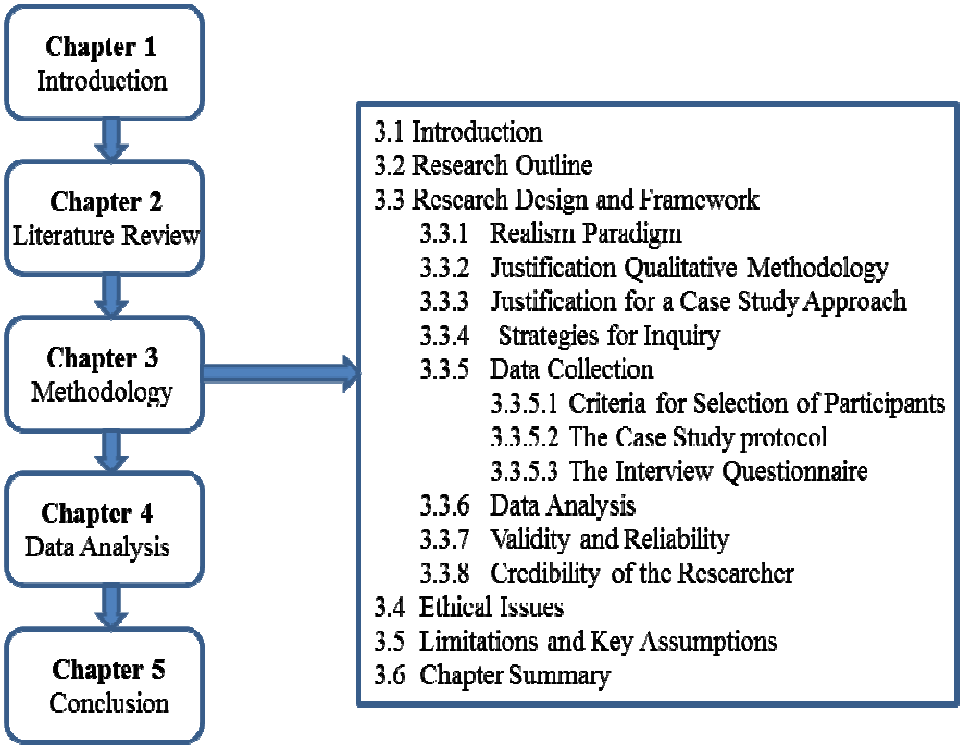
3.1 INTRODUCTION

The previous chapter critically reviewed the existing literature on contracts, established gaps in the literature and framed research questions consistent with addressing those gaps. Examined relevant theoretical background and reviewed literature. This was used to define the research questions. The research questions are centred on the 'What' and 'How', along with 'Why', to develop effective contracting strategies. For this research, the case study design framework is chosen. This framework takes into account the methods used to collect the data to provide more perspectives to investigate the phenomena within its real life context (Easterby-Smith et al, 1991; Perry, 1999; Yin, 1994). Each case represents a senior project manager in the oil and gas industry responsible for contract strategy formulation in a context. Each of the case formed the unit of analysis.

This research project has two main areas of interest, Contract formulation processes and Contract types. The benefits proposed to come from the research are the improvement in the contracting strategy formation process, and the provision of flexible options tailored to different scenarios in the use of any given contract type in the upstream oil and gas industry. To realize these benefits, the research method has as its objective the use of several methods used to collect the data to provide more perspectives to investigate the phenomena within its real life context (Easterby-Smith, Thorpe, & Lowe, 1991; Yin, 1994; Perry, 1999).

This chapter details the design of the research project and the methodologies used for the study. The chapter justifies the use of email interview survey methods used to collect the data, the target population, sampling strategy, interview question design, and strategies used to address potential bias issues (Davis & Cosenza, 1994). The methodology used for the data analysis is also discussed.

Figure 3.1: Outline of chapter 3



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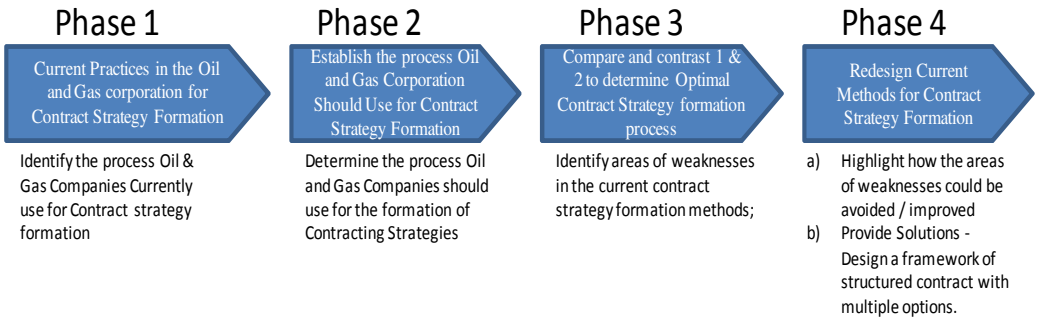
3.2 RESEARCH OUTLINE

To achieve the objectives of this research, the study was undertaken in four main phases. The outputs from each phase became inputs to the next phase. Figure 3.2 below depicts the sequence.

Figure 3.2: Research Program Phases



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3.3 RESEARCH DESIGN AND FRAMEWORK

A research design refers to 'the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study' (Yin, 1994; Rowley, 2002). Rowley (2002, p.18) describe research design as an action plan for getting from the research questions to conclusions. Denzin and Lincoln (2008) further describe the research design as a 'flexible set of guidelines' used to connect theory to strategies of inquiry and to methods for collecting empirical data.

Factors to be considered in choosing a particular style for a research include the overarching aim of the research, the specific analysis objective and its associated research questions (Miller & Crabtree, 1992). The applicability of these factors to this research has been discussed in detail in chapter 2 of this research study. The research objectives and four research questions to be used for this investigation were proposed at the end of chapter 2.

Other factors include 'the preferred paradigm, the degree of desired research control, the level of investigator intervention; the available resources; the time frame; and

judgments of sentiment and taste (aesthetics), as listed by Miller and Crabtree (1992). These are discussed in the following sections of this chapter. These factors, including those listed in the above paragraph, were considered in the selection of a research design for this study.

The components of a research design includes study questions, propositions, unit of analysis, logical link between data and the proposition, and the criteria for interpreting the findings (Rowley, 2002).

The following sections contain the proposed research style and its justification.

3.3.1 Critical Realism Paradigm

A Paradigm is described as the researcher's basic set of beliefs or as a net which holds the researcher's epistemology, ontological, and methodological premises which guides actions (Denzin & Lincoln, 2005; Guba & Lincoln, 1994). Patton (1990) stated that a paradigm reflects what is important, legitimate, and reasonable. Therefore, the choice of an appropriate paradigm for a research study is fundamental.

Based on the above descriptions of a paradigm and since the research questions and issues being investigated by this research are located within their real life context; the choice of a paradigm for the research should take into consideration the relationships between the researcher and the world being investigated (epistemology), the nature of reality (ontology), and how to obtain knowledge from project managers the oil and gas industry (methodology). The paradigm of choice should also recognise the situational and unique challenges of this research (Patton, 1990).

This research is bound by two main paradigms; positivism and interpretivism. To provide clarity, the main attributes of positivism and interpretivism paradigms are

summarized and compared below. The table is adapted for this research from multiple sources listed on the foot of the table below.

Table 3.1: Summary and comparison of positivist and interpretist approaches

Item	**Positivism** *(Focus on discovery of reality)*	**Interpretivism** *(Focus on understanding others action in relation to the researcher)*
Ontology *(Form and nature of reality)*	Reality is real and can be understood. (Relativist)	Reality is imperfectly and probabilistically understood due to the complexities of the world and human limitations.
Epistemology *(nature of reality between the researcher and reality)*	Objectivist. Findings are true. The world is seen through a single lens. Independent and value-free.	The world is viewed with open mind. Observers with some level of participation controlled by triangulating data. Value-bound
Methodology *(Techniques for collecting data)*	Experiment / Surveys. Sample size usually large. Data collection is by structured instruments. Interview questions are closed with limited probing.	Case studies/interviewing. Sample size is usually small. Data collection is by semi-structured and unstructured questions . Interview questions are open with probing.
Research position / Goal of investigation	Prescriptive, causal, deductive, theory confirming, ungrounded.	Exploratory, descriptive, theory building, inductive, and analytical.
Research Quality	External validity and	Construct validity is used to judge

	reliability are critical for the research quality.	the research quality.
Type of data gathered	Replicable, discrete elements, statistical.	Informational, Contextual, non-statistical, subjective.
Respondent's Perspective	Emphasize outsider's perspective.	Focuses on the internal perspective of the respondent
Data Analysis	Objective, value-free, statistical methods. Quantitative.	Interpretative, value-bound, non-statistical. Qualitative.

Source: adapted from (Denzin & Lincoln, 2005; Guba & Lincoln, 1994; Patton, 1990; Perry & Coote, 1994; Yin, 1994).

The approach of this study for this research is to investigate the current contract strategy formation practices in one major oil and gas Corporation. It was not feasible to carry out this study using all oil and gas corporations in the industry. The research questions for the present study consist mainly of 'how?', 'What?' and 'Why?' (Yin, 1994). The research seeks to understand content and to deduce meaning from the available information. The meaningful information is used to redesign contracting strategies formation framework. Data from various sources were collected and used to establish knowledge about external reality which may not be completely true (Guba & Lincoln, 1994). Within the interpretist approach, the critical realism paradigm is well suited to the nature of knowledge sought by this research. To minimize error this research relied on triangulation; it captured data from various sources and deduced meanings from these data (Easterby-Smith et al, 1991).

The positivism paradigm sees reality' in a completely different way. In the positivist paradigm reality is real and true and is seen in an objective way where inquiries take

place through a 'one-way-mirror' (Guba & Lincoln, 1994). For this research, reality is assumed to exist outside of the perception of the researcher but cannot be wholly understood because reality is too complex to be fully understood due to human limitations and the complexities of the world (Denzin & Lincoln, 2005; Guba & Lincoln, 1994; Patton, 1990; Perry & Coote, 1994; Yin, 1994).

The goal of this research is to identify, describe, and analyse information from various sources, deduce meanings, and to develop models from empirical data which are seen to be true to some extent, not the absolute truth, for use in the industry (Healy & Perry, 2000). This research is to a large extent exploratory, descriptive, inductive, analytical, and elaborates established theory. These investigation goals adopted by this research can be achieved within the critical realism paradigm. Therefore, the next task for this researcher was to choose an appropriate methodology to meet the requirements of the realism paradigm.

3.3.2 Justification for a Case Study Approach

This section provides the justification for the use of case study approach. Yin (1994, p. 13) defines case study as "an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident." Yin (1994) and Perry (1999) describes case studies as rigorous research approaches concerned with the collection of multiple evidence, in a real life context, about a specific aspect of interest. Perry et al. (1999) also used key words such as 'contemporary' and 'real life' but stated further that case study is a methodology which focuses on a particular part of an organisation or industry within its context, using variety of evidence, to rigorously explore and analyse contemporary real life experiences (Perry, Reige, & Brown, 1999). Rowley (2002) emphasised the importance of case studies research as the ability to undertake an investigation into a phenomenon in its context.

The factors taken into consideration in selecting the best research methods for this study were discussed in the preceding sections of this thesis. These include the type of questions, the extent of the researcher's control over behavioural events, and the

degree of focus on contemporary issues (Miller & Crabtree, 1992). The different forms of research questions and methods for investigating them are captured in the table below:

Table 3.3: Choosing a research strategy

Strategy	**Form of Research Question**
Experiment	How, why
Survey	Who, what, where, how, many, how much
Archival analysis	Who, what, where, how, many, how much
History	How, why
Case Study	How, why

Source: adapted from (Yin, 1994, p. 6)

The definitions discussed above clearly suits this research study because the research will be conducted within its real life context 'oil and gas'; the focus is on 'contract formulation strategies'; the empirical evidence includes data from various sources which will be analysed to deduce meanings and draw conclusions for the research. This activity further underlines the usefulness of a case study research which includes its ability to investigate in detail and in-depth 'how?' and 'why?' questions about a contemporary set of events over which the investigator has little or no control (Yin, 1994). The research questions for this study are mostly seeking to know 'why' and 'how'.

This research is focused heavily on a specific industry (oil and gas); and is investigating contemporary events using research questions and relying on multiple data sources. The goal of the investigation, based on the interpretist paradigm, is exploratory. Therefore, exploratory case study, as opposed to descriptive and explanatory, is most appropriate. However, there are some elements of explanatory case study in this research since it also investigates 'how' the current contracting

strategies are formed in the oil and gas companies. Such a mixed approach is supported in case study methodology (Yin, 1994).

In case study research, a variety of evidence from different sources can be used (Rowley, 2002). Evidence from primary sources are electronic and hardcopy documents (such as minutes of meetings, reports, and emails). Other sources of evidence include email interviews (structured, unstructured, and semi-structured), archival notes (organisation charts), and file notes. Evidence from secondary sources such as media reports and literature are considered as one of the sources (Saunders, Lewis, & Thornhill, 2003). Case study can be based on any mix of quantitative and qualitative approaches (Rowley, 2002). The identified instrument for data gathering and primary sources for this research includes email interviews, emails, and file notes if they have been provided as supporting evidence by participants.

3.3.3 Justification for Qualitative Methodology

This section considers the methodology for inquiry, in particular as to whether it should be qualitative or quantitative.

Methodology provides a logical way in which the research should proceed. The paradigm should provide answers to how to study the world, what is worth knowing, the questions to be asked and how the researchers and participant should engage in this inquiry (Guba & Lincoln, 1994; Patton, 1990; Perry & Coote, 1994). This research is looking at contract strategy formation process. Langley (1999) described research which focuses on strategy or process as ‘more complex phenomena’ and ‘even harder to isolate’ due to the ‘messy’ nature of the data. Process data has the following characteristics: ‘tends to be eclectic, drawing in phenomena such as changing relationships, thoughts, feelings, and interpretations’ (Langley, 1999, p. 692).

All variations in human experience cannot be fully handled by a single method. This research is looking at capturing data from one major oil and gas corporation for the studies. The targeted participants are in various countries in the world. Therefore, the peculiarity of this case that is participants working in one company but in different locations, needs to be considered in choosing the data gathering techniques and instrument of inquiries. Hence there is a need to ensure that the strategy selected for this research is able to 'deploy a wide range' of interconnected interpretive methods. This is possible only in qualitative methods (Denzin & Lincoln, 2005). This level of flexibility is also crucial, considering the 'messy' nature of the data and the need to take into account the 'context' of the data. Therefore, the methodology selected for this research is qualitative. Further, the case for the use of qualitative methodology for the analysis of the data can be established from the point of view that the data meet the following criteria adapted by Saunders et al (2003) from Dey (1993) and Healey and Rawlinson (1994):

Table 3.2: Comparison of Quantitative and Qualitative data approach criteria

Quantitative Data	**Qualitative Data**
Based on meanings derived from numbers	Based on meanings expressed through words
Collection results in numerical and standardized data	Collection results in non-standardised data requiring classification into categories
Analysis conducted through the use of diagrams and statistics	Analysis conducted through the use of conceptualisation

Source: extracted from (Saunders, Lewis, & Thornhill, 2003, p. 378).

In addition to the above, Miles and Huberman (1994) and Marshall and Rossman (1995) stated that in the selection of qualitative over quantitative methodology the researcher should be able to answer yes to one or more of the following six criteria adopted from Lee (1999, p. 41):

- Is it important for the researcher to understand the in-depth processes that operate within the organisation or industry?
- Do the research issues involve poorly understood organisational phenomena and systems?
- Is the researcher interested in the differences between stated organisational policies and their actual implementation (e.g. strategic versus operative plans)?
- Does the researcher want to study ill-structured linkages within organizational entities?
- Does the study involve variables that do not lend themselves to experiments for practical or ethical reasons?
- Is the point of the study to discover new or thus far unspecified variables?

For this research project, the above questions are applicable. It is the aim of this research to understand the in-depth processes used by project managers or contract managers in the oil and gas industry through the analysis of 'messy' data in order to deduce meanings which will be used to redesign the contracting strategies formation processes and also further elaborates the existing theories. This research seeks to address the processes of contracting strategies formation through the understanding of the holistic nature of interrelationships between contracting formulation strategy and their context.

Based on the nature of data collected, and since the present investigation represents exploratory field work which seeks to determine the processes currently used in the formation of contracting strategies in the oil and gas industry and based on the foregoing criteria, qualitative approach is most appropriate for this research study (Crabtree & Miller, 1992; Gahan & Hannibal, 1998; Langley, 1999; Yin, 1994).

3.3.4 Strategies for Inquiry

This research is aimed at establishing the current practices of 'how' oil and gas corporations form contract strategy and also to investigate 'why' they use the current approaches. Therefore the strategies for inquiry have to focus on the research questions, the purpose of the research, and the information that will most appropriately answer specific research questions and which strategy is most effective for obtaining the information' (Denzin & Lincoln, 2008, p. 33).

Most literature on research interviews agrees that the type of questions to be answered is most significant in selecting the strategies for inquiries (Yin, 1994; Rowley, 2002). The extent of the researcher's control over behaviours and the degree of focus on contemporary as opposed to historical events is also very important (Yin, 1994). Hence, the researcher should as far as possible exercise some flexibility in choosing the set of guidelines to be used for inquiries. Oil and gas practitioners work in different locations in the world. They are not concentrated in one location which might permit the use of a single strategy of inquiry. Prior to selecting the strategy for inquiry, the following attributes of email interviews (i.e. self-administered and interviewer administered) was examined for applicability to this research. Self-administered email interview are completed by the respondent; they are delivered using email, internet, postal system, or by hand. Researcher administered interview are carried out in face-to-face meetings or over the phone. Responses are recorded (notes) by the interviewer (Saunders, Lewis, & Thornhill, 2003).

Table 3.4: Main attributes of Email Interview

Attribute	**Postal**	**Telephone Interview**	**Structured Interview**	**Implications for this Research**
Population characteristics for which	Literate individuals who can be contacted	Individuals who can be telephoned;	Any individual; selected by name, organisation in the	The participants in this research are engineers, supply chain managers,

suitable	by post; selected by name; organisation	selected by name, organisation	street	and project managers. They are literate and hold at least a BSc degree. The names of the individuals and contact details are available to the researcher.
Confidence that the right person has responded	Low	High	High	Email interview shall be administered sent / returned using email. Hence 'greater controls' (Saunders et al, 2003).
Likelihood of contamination or distortion of respondent's answer	May be contaminated by consultation with others	Occasional distorted or invented by interviewer	Occasional contaminated by consultation or distorted / invented by interviewer	Respondents will complete the Email interview themselves in electronic form. Responses will not be tempered.
Size of sample	Large, Geographically dispersed	Dependent on number of interviews		It is not feasible to reach most of the participants for this research in their various locations worldwide. The participants fall into the 'hard (not feasible) to reach group' (Jupp, 2006)
Likely Response rate	Variable, 30% reasonable	High, 50 – 70% reasonable	High, 50 – 70% reasonable	Precautionary measures were taking to ensure high response rate (Snow & Thomas, 1994). The actual response rate for this research is 73%.
Feasible length of email interview	6 – 8 A4 pages	Up to half an hour	Variable depending on location	The length of the email interview questions are not more than five (5) A4 pages.

(Cont'd)

Attribute	Postal	Telephone Interview	Structured Interview	Implications for this Research
Suitable types of question	Closed questions but not too complex, simple sequencing only, must be of interest to respondent	Open and Closed questions, but only simple questions, complicated sequencing fine	Open and Closed questions, including complicated questions, complicated sequencing fine	Mostly open questions, with simple sequencing. Complex questions and jargon were avoided. Prior introduction at learning events and researcher's network was used to get the participants interested in the research.
Time taking to complete collection	4 – 8 weeks from posting (dependent on number of follow-ups)	Dependent on sample size number of interviews, but slower than self-administered for same sample size		Email interviews were returned within 4 weeks of distribution.
Main financial resource implications	Outward and return postage, photocopying, clerical support, data entry	Interviewers, telephone calls, clerical support. Photocopying and data entry if not using Computer Aided Technology (CAT); programming software cost if using CAT	Interviewers, travels, clerical support. Photocopying and data entry if not using Computer Aided Technology (CAT); programming, software cost if using CAT	No additional cost for completing and returning the Email interviews. It was all done by email. Also data was directly typed by the respondent in Microsoft Word to ensure ease of input into data analysis tool. The licence for NVIVO (data analysis tool) is provided by QUT.
Role of the Interviewer / Field worker	None	Enhancing respondent participation, guiding the respondent through the questionnaire, answering respondents' questions		Researcher spent most of his time making phone calls including responding to emails to clarify participants' questions. Follow-up

			questionnaires were used to seek clarity or explore points raised in previous response returned by the participants.
Data Input	Closed questions can be designed so that responses may be entered using optical mark readers after questionnaire has been returned	Response to all questions entered at the time of collection using CAT	All responses were directly typed by the respondents into the email interview in Microsoft word document.

Source: adapted from (Saunders, Lewis, & Thornhill, 2003, p. 284).

The main data collection instrument is a semi - structured interview but the administration of the tool is different from the traditionally known techniques of face-to-face or telephone interviews. Such flexibility is acceptable in modern research. A mixed but flexible strategy of inquiry which takes into account access to the participants, convenience of the participants, and most effective for obtaining the information will be used for this research (Lee, 1999). The researcher is located in a very remote part of Malaysia requiring over two hours flight to the main capital of Malaysia. This field study involves real managers and organisation. The participants in this research are engineers, supply chain managers, and project managers working in different locations of the oil and gas corporation worldwide.

The target of the data collection effort is to seek responses from over seventy participants in different parts of the world. Taking into consideration the need for a flexible strategy of inquiry, the email interview designed for this research shall be self-administered by email in conjunction with telephone interview. Furthermore, *'written interviews'* provides the added advantage to generate larger sample of data, access to wider audience of participants, and at cheaper cost compared to interviews

(Snow & Thomas, 1994). Therefore, the recommended strategy for inquiries for this research is the interview schedule emailed to respondents.

3.3.5 Data Collection

This section outlines the procedure for data collection. Based on the above section, the interview questionnaires were designed in such a way that the respondents could understand and answer the questions without any need for face-to-face interview guidance. However, the researcher's contact details were provided so that respondents could clarify the intent of questions if this was required. Moreover, there was follow up with the respondents by telephone or subsequent email which also provided an opportunity for clarification.

Saunders et al (2002) describes qualitative data as based on meanings expressed through words; collection results in non-standardised data requiring classification into categories; analysis conducted through the use of conceptualisation.

The paradigm and methodology chosen for this research is interpretist, exploratory, qualitative case study (Perry & Coote, 1994). The exploratory nature of this research is most appropriate for the inquiry which requires the researcher to 'make sense' or deduce meanings from the non-standardised data collected. The interview questions investigates each sub-units individually to produce results which will be aggregated to establish a view of contract formulation processes in the oil and gas industry. The participants are based in various countries worldwide including Malaysia, Brunei, Nigeria, Canada, Brazil, UK, Oman and the Netherlands. The case study nature of this research requires each respondent to contribute data based on their experiences and work environment.

The decision to self-administer (email) the interview schedules as opposed to face-to-face interviews hinges on the following: the spread of the participants in terms of location (worldwide), the time and feasibility for the researcher to conduct the

interviews; and the cost of collecting the data. Whilst it is recognised that this research will benefit from the numerous advantages of Interview schedules which includes 'written interview that can be mailed', 'efficiency - speed, low cost – to generate large amount of data', and the benefit of being able to collect data over a long period' ((Snow & Thomas, 1994); (Dess & Davis, 1984); (Norburn, 1986)). The researcher needed to be mindful of the major drawback in the use of Email Interview schedules which includes 'low response' rate Gaedeke and Tootelian 1976 *as* cited by Snow and Thomas (1994). The issues of low response has to be addressed both in the design of, and in the administration of, the interview schedule. Detailed precautionary measures to address this drawback in this research are discussed below.

The following precautions were taken in the administration of the email interview q to avoid the pitfalls of using email interviews such as those listed above.

(i) Participants were recruited at oil and gas companies learning events. The researcher arranged with the Learning Event Coordinators to get five minute slots to brief engineers, supply chain managers, and project managers about the research and to solicit informed consent for their participation in completing the research questionnaires, thereby obtaining informed consent and establishing prior contact which will lead to a higher response rate (Snow & Thomas, 1994). The names and contact email of volunteers were collected and used to forward the email interview to them.

(ii) The researcher used his industry network to request colleagues and senior managers to complete the email interview. It is ethical and acceptable for the researcher to use his influence and relationships (Kirk and Miller, 1986), to get qualified participants to participate in the research. Industry contacts and networks built for many years in the researcher's previous work postings and work assignments were used for this purpose. Without these trust-based relationships, the access to respondents and the quality of the responses and thus the findings would have been compromised.

(iii) The researcher also used snowballing techniques, that is, relying on existing networks and colleagues from other oil and gas companies to circulate the questionnaires to their colleagues to seek participation from the industry. This method of convincing top managers to distribute survey is recognised by Hambrick (1982) as effective for yielding high response rates.

Another precautionary measure taken to maximise the response rate and avoid pitfalls is to use the survey in conjunction with telephone interview (Hambrick, 1981). This is in the recognition of that respondents are top-level managers and are frequently time-poor. Some of the participants may not have the time to complete the survey or complete the email interview. For these managers and other participants in this group, telephone interviews were used to solicit responses and to complete the emailed interview schedules.

To further maximize the response rate, confidentiality of the responses and that of the participants was assured and promised to the participants using the QUT Ethics Participants Information Sheet. All responses are treated as anonymous. The names and identity including Company name/employer of the respondent have been removed from the original questionnaire responses submitted by the participants or interview transcripts. This action encouraged the participants to freely complete and return the questionnaires. Yin (2003) indicated that where feasible, the researcher can seek compromise to allow future replication of studies.

The case for anonymity in the collection of the data and in handling the participant's personal information is critical considering that the respondents are practitioners in the oil and gas industry. They are currently employed by these companies. Most of these employees have signed confidentiality and non-disclosure agreements with their various employers. Furthermore, the nature of any research that could be seen as likely to expose weaknesses in the current practices of contract strategy formation may contribute to error, bias, or skewness in the response data, based on informal social or 'political' pressure in operating companies, or fear of reprisals on the part of respondents. Hence Yin's (2003) suggestion to disguise identity to protect

respondents was thought appropriate in accordance with QUT ethics. Jupp (2006, p. 3) further made it clear that 'in qualitative research, identifiers such as names, geographical clues and vernacular terms can also be removed in the writing up stage'. This approach is also supported by Saunders et al (2003, p. 140).

3.3.6 Criteria for Selection of Participants

Selecting the sampling strategy should depend primarily on 'what you want to find out, what will be useful, what will have credibility, and what can be done within your available resources' (Patton, 1990). Since the strategy for this research is to collect qualitative data; non – probability, as opposed to probability sampling, techniques was selected. In particular, the sampling techniques used are purposive sampling and snowball sampling techniques. These techniques are relevant because it does not specify any rule for the sample size (Saunders et al, 2003). Furthermore, it is most difficult to reach some of the participants for this research in their various locations around the world. Hence the need to strike a balance between what is practical and feasible (Patton, 1990; Jupp, 2006).

The choice of the snowballing sampling techniques is critical to this research because of the nature of the 'restrictions' placed by most oil and gas companies on the provision of information to external parties. Therefore, practitioners may feel obliged to provide particular responses if requested to do so by trusted sources, or even managers (Hambrick, 1982; Snow & Thomas, 1994).

The following selection criteria were used for the survey participants:

1. The participant shall be oil and gas project management personnel or specialists in contracting and/or users of contracts in one oil and gas company.
2. The selected participants shall be those with over ten-year experience in oil and gas industry, and at least six-years experience in capital projects.
3. A capital project refers to long-term investment projects requiring significant resource investment to design, build/construct, or maintain facilities or assets in

oil and gas (Berends & Dhillon, 2004). The participants in this research are engineers, supply chain managers, and project managers in oil and gas industry worldwide.

3.3.7 The Case Study protocol

The case study protocol used for this research includes the design and administration of the email interview The email interview are designed to meet the case designs protocol presented in Rowley (2002). The case study selected for this research is the multiple case design which aims to produce 'literal replications (i.e. similar results) or contrasting results but for predictable reasons (theoretical replication)' (Rowley, 2002).

Seventy (70) participants were selected to complete the emailed interview schedules. A total of 51 questionnaires were completed and returned by the respondents. Each respondent represents a case. According to De Ruyter and Scholl (1998); a range of 10–40 cases are considered the minimum number of cases where 60 is the maximum number of cases required for a study at this level to achieve redundancy. Rowley (2002) and Nair and Reige (1995) both agreed that six cases should be sufficient to achieve stability. In particular, Rowley (2002) suggested that 6 –10 cases might be used to achieve literal replication. The completed number (51 cases) of responses received from the participants is above the minimum number of recommended cases. For this research, it is anticipated that the 51 cases can be used to reach a point of redundancy or saturation, that is, no new information is uncovered through the further continuous gathering of data (Guba & Lincoln, 1982).

The details of the participants who completed the questionnaires are in Table 3.5 below. The table contains the participants' Job titles/ job category, their current work location, their specialisations, industry and project management experiences. Each respondent is represented with a unique identity 'Respondent ID' in keeping with the agreement of non-disclosure of identities of the participants (Perry and Coote, 1994;

Yin, 2003). Samples of the consent to provide data and the questionnaire are in appendix B and appendix C respectively.

Table 3.5: Email Interview Respondents for this Research

Respondent ID	Job Classification	Work Location	Specialisation	Sex	Industry Experience (Years)	Project Management Experience (Years)
CS001	Senior Lecturer Oil and Gas Projects	Texas, USA	Project Management	M	25	12
CS002	Discipline Engineer	USA	Project Management	M	12	9
CS003	Operations Engineer	Australia	Plant Operations	M	20	11
CS004	Project Manager	France	Project Management	M	22	15
CS005	Team Leader Cost	Netherlands	Cost management	M	23	21
CS006	Estimating Engineer	Netherlands	Cost & Planning	M	12	12
CS007	Discipline Engineer	Netherlands	Project Management	M	18	15
CS008	Project Manager	UK	Project Management	M	23	18
CS009	Operations Engineer	Norway	Project Management	M	33	25
CS010	Operations Engineer	Denmark	Plant Operations	M	28	12
CS011	Project Manager	Netherlands	Project Management	M	28	24
CS012	Discipline Engineer	Kuala Lumpur	Project Management	M	21	15

CS013	Project Manager	Netherlands	Project Management	M	22	14
CS014	Senior Lecturer Oil and Gas Projects	Texas, USA	Contract strategy	M	30	12
CS015	Learning Manager Oil & Gas Projects	Australia	Project Management	M	30	25
CS016	Project Manager	UK	Project Management	M	30	26
CS017	Contract Team Leader	Malaysia	Supply Chain management	M	15	9
CS018	Project Manager	UK	Project Management	M	35	32
CS019	Contract Manager	Canada	Supply Chain management	M	26	20
CS020	Contract Engineer	Brunei	Supply Chain management	M	28	13
CS021	Project Manager	Brunei	Project Management	M	30	18
CS022	Project Engineer	Canada	Project Management	M	18	15
CS023	Discipline Engineer	Brunei	Project Management	M	22	18
CS024	Project Services Leader	Brunei	Project Management	M	27	25
CS025	Field Engineer	Brunei	Project Management	F	14	14
CS026	Procurement Manager	China	Supply Chain management	F	25	22
CS027	Engineering Manager	Singapore	Project Management	M	29	27

(Cont'd)

Respondent ID	Job Classification	Work Location	Specialisation	Sex	Industry Experience (Years)	Project Management Experience (Years)
CS028	Project Leader	Nigeria	Project Management	M	18	15
CS029	Project Engineer	Oman	Project Management	F	20	16
CS030	Planning Engineer	UK	Project Management	F	23	17
CS031	Head Contracts	Brunei	Supply Chain management	F	26	12
CS032	Contract Manager	Nigeria	Project Management	M	27	23
CS033	Project Engineer	Brazil	Project Management	M	10	8
CS034	Project Services Lead	Nigeria	Project Management	M	17	12
CS035	Cost Engineer	Netherlands	Project Management	M	12	7
CS036	Contract Engineer	Netherlands	Supply Chain management	M	18	12
CS037	Project Engineer	Netherlands	Project Management	M	16	10
CS038	Project Services Manager	Philippines	Project Management	M	22	18
CS039	Project Delivery Manager	Kuala Lumpur	Project Management	M	28	24
CS040	Project Engineer	Qatar	Project Management	M	25	21
CS041	Project Engineer	Nigeria	Project Management	M	26	18
CS042	Project Engineer	Malaysia	Project	M	28	24

			Management			
CS043	Project Engineer	Malaysia	Project Management	M	21	18
CS044	Discipline Engineer	Brunei	Project Management	M	18	10
CS045	Project Engineer	Nigeria	Project Management	M	30	26
CS046	Project Manager	Nigeria	Project Management	M	28	25
CS047	Project Manager	France	Project Management	M	27	24
CS048	Contract Lead	Nigeria	Supply Chain management	M	30	25
CS049	Project Engineer	Nigeria	Project Management	M	13	12
CS050	Maintenance Engineer	Nigeria	Plant Maintenance	M	17	15
CS051	Team leader Contracts	UK	Supply Chain management	M	26	21

Source: developed for this research

3.3.8 The Interview Questions

One of the major challenges in data collection is ensuring that the data collected would enable the research questions to be answered in order to deliver on the objective of the research (Saunders, Lewis, & Thornhill, 2003). Saunders et al (2003) developed 'data requirements' framework to enable researchers to check that all the investigative questions for the research are satisfactorily answered. Using this framework, this research should be able to determine the type of responses required for each questions and the variables for which data is required to be collected. For this research a 'data requirement' table is created below using the Saunders et al (2003) framework.

The interview questions are semi-structured. The level of the questions in sections A and B of the email interview are in line with the parameters defined by Yin (2003) as follows: Section A of the email interview asked questions about the background (job title, specialization, work location and experiences) of the respondents. Section B – contains questions designed to explore specific areas and issues in contracting in the company selected for the case study; questions designed to identify patterns in the oil and gas industry; questions developed from literature survey; and questions designed to draw conclusions and recommendations. Therefore to a large extent the email interview schedule is designed to contribute to rapport building and also pose questions which address the research questions (Yin, 2003). Refer to the table below for the listing of the specific questions and the target issues including sequencing of their occurrence (Lee, 1999).

Table 3.6: Research Questions and relevant investigative questions

Investigative Questions	**Variables Required**	**Research Issue (RI) to be answered by the each question**
SECTION A		
Please complete section A: 1) **Job Title** 2) **Work Location** 3) **Specialisation*** 4) **Sex** 5) **Industry Experience (Number of Years only)** 6) **Project Management Experience (Number of Years only)** 7) **Date this**	Background of the respondents	Remark: Information provided will be used to further screen the participants whether they meet the qualifications and experiences required to participate in this research

questionnaire was completed ***this refers to the appropriate categorisation for your present job. Example: Supply Chain Management, Project Management, etc***		
SECTION B		
Q1: Describe the current contracting strategy formation process in your organisation?	Description of current contracting process steps.	RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?
Q2: What are the main issues or problems with the current contract process?	Raise issues or problems including opportunity for improvement of the current contracting processes.	
Q3: List the most popular contract types used under the current contracting environment? **<u>Sub Question</u>** What do you consider, if any, the advantages of reimbursable contracts over lump sum contracts, as applied to your Corporation Projects?	Why some contract types are preferred over the others; Advantages & disadvantages of each contract types.	

(Cont'd)

Investigative Questions	Variables Required	Research Issue (RI) to be answered by the each question
SECTION B		
Q4: What are the reasons for the selection of these popular contracting types? **Sub Questions** a) What do you consider as the main drivers for the selection of a Contracting Strategy for Capital Projects? b) How are these drivers implemented and managed during the CAPEX phase of the Project.	List of drivers used for contracting strategy selection; Methods of identifying, evaluating, ranking the drivers; Drivers identification and selection issues.	RI2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?
Q5: Does the process for selection of Contract strategy change depending on Contracting type selected?	Relationships between Contract Types & Drivers Selection; Drivers identification and selection issues.	RI2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?
Q6: How do you define what a 'correct' or 'optimal' contract is?	Respondent definition of optimality in contract; How to achieve optimal contract or a complete contract.	RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?
Q7: List potential areas in the contracting process that costs could be reduced?	How to achieve effective contract strategy; How to reduce cost in Contract process; Contract related	RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?

Q8: How can cost reduction be achieved in the listed contracting process?	issues at each phase of the Project lifecycle.	
Q9: What are the payment structures used for a given contract?	How are the Payment types identified / selected?	RI2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?
Q10: What are the factors taking into considerations in the design of payment structure for a given contract?	What are the most popular payment types What are the relationships btw payment types / Contract types?	
Q11: What are the characteristics of a person, their positions, their assumed experience and general background involved in contract strategy formation?	Who (What type of animal) background / experience People competencies / experiences issues or opportunity for improvement	RI4: What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?
Q12: What do you consider adequate qualifications, experience, and background for a person to be able to develop a contract strategy?		
Q13: What tool(s) are used by your company to arrive at a decision for selecting appropriate Contracting Strategy? Is this tool adding value to the process? Why?	What tools used for the selection of contracting strategies Benefit and/or issues with usage of tool or non-usage	RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?
Q14: What is your experience in designing and	How are incentives designed	RI2: How are the major drivers for Contract strategy formation

using positive and/or negative incentives? <u>Sub Questions</u> How is owner / contractor objective aligned?	Issues and/or opportunity for improvement of current incentive design	identified, evaluated and ranked in importance and impact?
Q15: How is contract associated risks identified in a capital project	How are the risks identified?	RI3: What is the impact of identifying each risks element in the respective contracting types (Lump sum and reimbursable) and properly allocating the risks regardless of the contracting type selected.
Q16: How is the contract associated risk assigned between contractors and the owner	How risks assigned between owner Contractors?	

Source: developed for this research

To achieve convergence, which is one of the main strengths of the semi-structured interview in case studies (Yin, 2003; Rowley, 2002), this research drew on the benefit of the researcher's professional network: this network enabled helped the researcher review and forward additional questions to the respondents to clarify or probe further information previously provided (Davis & Cosenza, 1994). Convergence is defined as exploring data/evidence from multiple sources (triangulation) to corroborate different sources or findings until a common pattern (convergence) can be achieved (Rowley, 2002). This research study will use multiple sources of data collection to assure construct validity. Methodological triangulation, that is, using multiple methods to study the problem, will help to achieve validity and reliability (Patton, 1990). In semi-structured interviews, follow-up questions to probe further answers provided by the interviewee can be very useful to achieve the sought-after convergence.

3.3.9 Data Analysis

The main steps taking to collect data for this research are detailed above. This section deals with the next step of how to systematically analyse the data collected in such a way that it allows for meaningful conclusions to be drawn. The overarching aim of data analysis in a qualitative research is to allow the true meaning of data to emerge (Maykut & Morehouse, 1994; Perry, 1999).

Miles and Huberman (1994) describe data reduction, data display and drawing/verifying conclusions as three concurrent activities in the process of data analysis. The activities involved in the data reduction process ranges from selecting, focusing, simplifying to transforming the data into meaningful piece of information. Data display can be achieved through coding to organize and compress the data to facilitate drawing conclusions. The main focus of data analysis based on the Miles and Huberman's process is the ability to explore and transform the data to make sense of the Respondents' experience of contract formulation strategy. Coding has been used by many qualitative researchers to facilitate the process of transforming the data (Rowley, 2002).

The coding process involves three passes, – **open coding** (that is, assignment of labels to themes and categories); **axial coding** (that is, discover interactions and relationships including new ideas and new areas for coding); and **selective coding** (that is compare, contrast, and generalization) (Miles and Huberman, 1994; Neuman, 1994). Saunders et al (2003) refers to the process of analysing data as generating categories and reorganizing data or designing a matrix and placing data together within cells. A thorough generalization involves adherence to the following principles which are the attributes of a good case research Yin (1994) and Rowley (2002, p. 24):

1. The analysis makes use of all the relevant evidence.
2. The analysis considers all of the major rival interpretations, and explores each of

them in turn.

3. The analysis should address the most significant aspect of the case study.
4. The analysis should draw on the researcher's prior expert knowledge in the area of case study. However, the researcher needs to adopt a cautious attitude to reduce bias.

For this research, the following measures were taken to increase generalisability. All evidence collected was thoroughly examined for relevance and interpreted accordingly using codes and hierarchical data structure. The research question focussed the analysis to address the most significant aspects of the case. Since this is a value-bound research, the researcher's experiences in the oil and gas industry was valuable to ensure appropriate interpretation of the data.

The task of data analysis, according to several authors, is not straightforward (Huberman & Miles, 2002; Rowley, 2002). Also, the challenge of the extent and complexity of the data analysis is also pointed to by statement that 'data analysis of the rich resources - which includes a multitude of different evidence from different sources - is based on examining, categorising and tabulating evidence to assess whether the evidence supports or otherwise the initial proposition of the study (Rowley, 2002 p. 24). Huberman and Miles (2002) describe potential sources of bias in data analysis namely (i) ethical compromises or distortions, (ii) background experience of the evaluator, and (iii) limitations in human information processing abilities (Huberman & Miles, 2002).

For this research, measures have been taken, as shown in preceding sections, to address the biases stated above. The design of the email interview based on the research questions and the fact that the respondents directly completed the email interview helped to manage the issues of compromises and distortions (Saunders et al, 2002). The potential limitations of the biases of the human information processing abilities in coding a large qualitative data set were addressed by the use of the data processing tool NVIVO (Gahan & Hannibal, 1998).

NVIVO is an off-the-shelf computer based tool used for the analysis of qualitative data. NVIVO helped to reduce the collected data and presented it in the simplest possible way. It provided a faster coding process of ideas from the respondents and documents, preventing delays during the data analysis (Bazeley & Richards, 2000). For this research, open codes (referred to as tree nodes in NVIVO) were created and organised into hierarchical structure of data. The creation of codes facilitated the discovering of interactions and relationships including new ideas and new areas of data for additional coding. The tree nodes and hierarchy were then queried. The reports were compared and contrasted for generalisation to elaborate the existing body of knowledge and theory, where there was evidence from the data. The meaningful information was used to construct a framework of the current practices of contracting strategies formation. NVIVO also served as the 'case study database' containing multitude of evidence from different sources gathered for this research. Having this database strengthened one of the outcomes of the research which is the repeatability of the research thereby increasing the transparency of the findings. Furthermore, the use of NVIVO for data analysis purposes had many benefits, such as quick access to the data, easy location of the data, easy to find details in the data, visualisation capabilities, and easy retrieval of emails..

In the analysis of the data collected, the main objectives was to 'look for regularities' through the study and interpretation of the interview scripts and responses to the email interview in order to tell the story of how the themes are related and how the characteristics of the speaker accounts for the existence of the themes (Bernard & Ryan, 2010). This analysis also achieved the exploratory objective of this research which was to establish initial themes and patterns and to build the framework of how contract strategy is formulated in the oil and Gas Corporation. Therefore, the intention of the analysis is to find themes, code the themes, discover codes and build the categories.

To begin the analysis of the data – the following tasks were carried out:(i) Discover themes and subthemes, (ii) describe elements of the themes, (iii) build hierarchies of the themes and codebooks (iv) attach themes to chunk of data or texts, and (v) Link themes into theoretical model (Bernard & Ryan, 2010). The technique used for

discovering the themes was line-by-line analysis which is labour intensive and according to (Bernard & Ryan, 2010) is something 'only people can do'. In addition to the above manual analysis, NVIVO was also used to provide further computational analysis and key word search. The word tree of NVIVO was also very useful in building the word string. However, based on my experience in the course of analysing the data using NVIVO, I discovered that the tool cannot deliver the line-by-line analysis which is required to achieve clarity to interpret the data and hence deduce true meaning. NVIVO suits short responses, but to derive useful meaning from longer responses, it was necessary for the researcher to manually examine the raw data from the interviews, and to interpret it for significance.

3.3.10 Validity and Reliability

Whilst it is noted that the criteria for judging interpretative research are still fluid and emergent; validity has remained the main issue in the legitimacy of a qualitative research (Denzin & Lincoln, 2005; Huberman & Miles, 2002; Kvale, 1996; Kirk & Miller, 1986; Eisenhardt, 1989). There is continued debate on the usefulness or legitimacy of validity in qualitative inquiry. Wolcott (1990) and Huberman and Miles (2002) both agreed that 'understanding is a more fundamental concept for qualitative research than validity' (Wolcott, 1990 p. 146) as cited in Huberman & Miles, 2002). Guba and Lincoln (1982) argued that the term 'validity' belongs to the positivist school of thoughts and should be replaced with the concept of 'authenticity'.

Given that in the field of management research, validity and reliability is generally regarded as the basis for the acceptance of a given piece of research as knowledge (Rowley, 2002), the testing of this research will use a similar model. The tests used to establish the quality of this empirical qualitative research are tabulated below. This study seek to satisfy four criteria to establish the quality of empirical qualitative research tabulated below. The table is adapted from Shenton (2004, P. 63)

Table 3.7: Testing of Case Study design

Tests	What is it?	Tactics	Phase of research in which tactics occurs
Credibility	'How congruent are the findings with reality' in establishing 'trustworthiness' (Shenton, 2004, p.64	Adopt well established research methods. Where possible methods used in comparable studies in the past; Early familiarity with the culture of participating organisation; random sampling; triangulation; honesty in informant iterative questioning; negative case analysis; frequent debriefing; peer scrutiny of research project; researcher's reflective commentary; background, qualifications and experience of investigator; member check (i.e. on the spot check of accuracy of data (Guba and Lincoln, 1985); and detailed description of the phenomena under scrutiny; examination of previous research finding	Data Gathering and Data Analysis
Transferability	Demonstrating that the result of the work can be applied to a	Assume each unique case as an example within a broader group; provide sufficient contextual information to	Research Design; Data Analysis

	wider population	enable practitioners relate the findings to their own position; convey the boundaries of the study; and provide the results within the context of the particular characteristics.	
Dependability	In-depth methodological description to allow study to be repeated	Report the process within the study in detail – this includes the research design and its implementation; the operational detail of data gathering; and the reflective appraisal of the project	Research Design
Confirmability	Investigator's comparable concern to objectivity	Triangulation to reduce effect of researcher's bias; admission of researcher's belief and assumptions; recognition of shortcomings of the study methods; In-depth methodological description to allow to allow integrity of research results; and the use of diagrams to demonstrate audit trail.	Research Design, Data Analysis

Source: Adapted from Shenton, 2004, p.63).

3.3.11 Credibility of the Researcher

Qualitative research is in social science that depends on watching people in their own territory and interacting with them in their own language and in their own terms.

(Kirk & Miller, 1986, p. 2). This research is qualitative. It is rooted in social science. A qualitative research has to be 'naturalistic, ethnographic and participatory' (Kirk and Miller, 1986). If qualitative research has to be truly naturalistic, ethnographic and participatory, the researcher should to a large extent be sufficiently aware of cultural context of the research so as to confidently interpret the findings (Kirk and Miller, 1986).

Guba and Lincoln (1982) distinguished rationalistic and naturalistic paradigms of inquiries. While naturalistic see the relation of values to inquiry as 'value-bound', the rationalistic sees it as 'value-free'. What does this all mean? *Value-bound means that the 'inquiry is inevitably grounded in the value systems that characterized the inquirer, the respondent, the paradigm chosen, the methods selected, and the social and conceptual contexts* (Guba & Lincoln, 1982). The rationalistic school of thought, presupposes that inquiry is value-free, that is, the data speaks for themselves', transcend the value of the inquirer and respondents, and outcomes of the inquiry are guaranteed by the methodology chosen (Guba & Lincoln, 1982). Miles and Huberman (2002) averred that to study society naturalistically is in 'a spirit of unfettered inquiry', that is, 'researcher positions himself as a witness to a social situation or setting'.

The researcher is an oil and gas industry practitioner with significant experience in formulating Contracts in Capital Projects. However, the fact that the researcher is an experienced oil and gas professional may be perceived as a cause of bias in the collection and interpretation of the data for this research. Providing that appropriate measures are taken to ensure that such expert knowledge or experience does not lead to bias, it is submitted that it is an advantage because the researcher can speak and understand the jargon of the oil and gas engineers, and is able to identify the presence or absence of the required data for the research (Kirk and Miller, 1986).

This judgement brought by the researcher is described by Miles and Huberman (2002) as 'deep familiarity' which involves researchers subjecting themselves to the environment under examination so that they can physically penetrate the cycle of

response of the participants' social situation or work situation. The caution is that this situation of deep familiarity can also be seen as a source of bias, if it results in 'a tendency for the researcher to collect data, and/or to interpret and present these data in such a way as to favour false results' (Jupp, 2006).

To avoid biases on the part of the researcher, the general tendency is for the researcher to document all his initial assumptions so that they can be cross checked for bias at the conclusion of the research for biases Jupp (2006). Further, it is argued that a researcher has to be 'objective' and to pursue the research with commitment to discovering the truth just like 'anyone' regardless of their 'personal characteristics or social position' Jupp (2006).

This allows the characteristics of a good researcher to be presented as: *Sound familiarity with the phenomenon; a multidisciplinary approach; good investigative skills and the ability to 'ward off premature closure.* Miles and Huberman (1994)

It is of obvious value for the present researcher to possess these characteristics. The idea of 'value-free' can be left to history in favour of 'value-bound' research. Furthermore, as a social science, Qualitative research is empirical. Therefore, true knowledge can be built from the foundation through logical means.

3.4 ETHICAL ISSUES

In terms of the Queensland University of Technology (QUT) ethics compliance requirements, this research is considered to be of a general low risk. This assessment is based on potential risks identified for a project. Given the research topic and the methods used in administering the interview questionnaires, there were no foreseeable risks of harm or discomfort for the participants as a result of their participation. The research participants faced no additional risk other than that associated with their normal day-to-day living. However, it is a mandatory requirement of QUT to ensure that all research involving humans complies with

ethics requirements. This is also supported by Cooper and Emory (1995) who advocated that responsible researchers must take appropriate and proactive steps during planning to handle anticipated ethical issues in the research.

Thus, prior approach to the participants in company's learning events was essential to brief engineers, supply chain managers, and project managers about the research and to solicit informed consent for their participation in completing the research interviews. The participants were advised that their participation was voluntary. They were assured that nothing about their participation, name, or company name will be reported as part of the interview – anonymity agreed (Patton, 1990).

Each participant was issued with the participant information sheet (PIS) which contained descriptions of the research, what they were expected to do, how the information provided by them will be used including their rights. The participant's name and identity including Company name/employer of the respondent was removed from the original email interview responses submitted by the participants. The need to assure confidentiality through disguising the case study or information supplied is supported by Yin (2003). The data captured is restricted to the researcher to protect the identity of the respondent from being made public.

3.5 LIMITATIONS AND KEY ASSUMPTIONS

The major limitations for this research are as follows:

Limitation as a result of the methods used in the administration of the interview schedule - email. Traditionally, semi-structured interview are administered face-to-face. There is also the added advantage to probe in-depth and follow-up statements and answers provided by the interviewer. But it should be noted that the main criticism of the in-depth interview is its 'heavy' dependence on the interview skills and ability of the interviewer (Zikmund, 1997).

This research has elected to forward the semi-structured interview schedule by email to the participants. This approach has advantages and disadvantages. Not least, it eliminates the 'weaknesses' of the interviewer; but it should be noted that the respondents are well-educated people and with sound working experience. Completing an exploratory email interview was unlikely to be a problem. Points needing clarifications could be settled by provision of the researcher's phone number and email address. Follow-up or further probing can be carried out via emails or telephones after a review of initial submission of the interview questions.

Sampling limitation as a result of restricting the study to one oil and gas company, if argued as non-representative of the entire oil and gas companies, may become an issue. But the issues affecting one oil and gas corporation can indeed be generalised to be similar to those experienced by other oil and gas companies in the industry. Therefore, it is safe to generalise the outcome of this research, within certain limitations, to be applicable to all oil and gas companies, thus enhancing its utility.

3.6 CHAPTER SUMMARY

The aim of this chapter is to demonstrate how the research questions and issues raised in the preceding chapter on literature review were investigated. The research paradigm which will guide the researcher and the selection of the most appropriate methodology for the research was also selected and discussed in details.

This research is an exploratory, case study research using the qualitative methodology. The research instruments for data gathering were carefully selected based on the chosen methodology; but with some flexibility in the administration of emailed semi-structured interview questions. This chapter also highlights the challenges and precautions taken to ensure that the flexibility in the data collection approach do not impact the response rate of the participants. The actions and limitations of this research are guided by the QUT ethics compliance requirements.

The participants in this research and their responses to the questionnaires were and will be treated as anonymous.

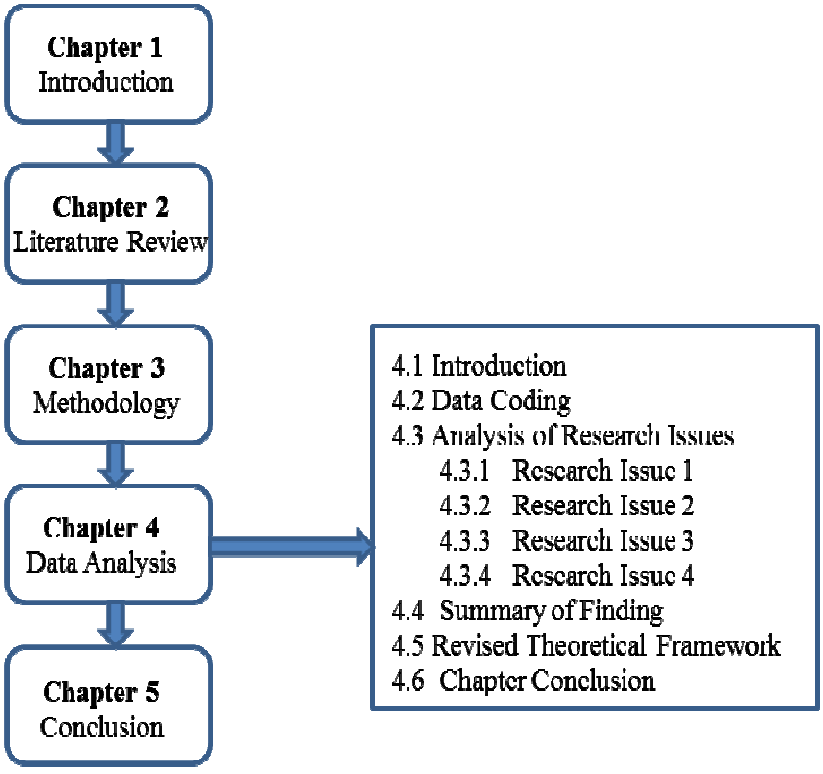
The overarching aim of data analysis in a qualitative research is to allow the true meaning of data to emerge. The next chapter will discuss the data analysis in detail. The data analysis chapter will build on the summary given in 3.3.6 above. This chapter provides details on how the data collected were systematically analysed to allow meaningful conclusions to be drawn.

Chapter 4: Data Analysis

4.1 INTRODUCTION

The previous chapter described and justified the research methodology employed to address the research question; (how structured contract strategies can be formulated in the oil and gas Industry. This chapter presents the findings of the analysis of the data collected to address this question. The purpose of this analysis is to develop a model of the current contract formulation strategies employed in the oil and gas industry. This model then contributes to the development and test of an optimal contract formulation strategy (see Chapter 5). The chapter is structured into four main sections. The first and second sections contain the introduction to this chapter and present the details and description of the respondents. The third and fourth sections contain the detailed analysis of the data for the research issues and summary of findings including current contract formation framework.

Figure 4.1: Outline of chapter 4



Source: developed for this research

4.2 DATA CODING

This research used one main question and four sub questions in the study.

The main question is: **how can structured contract strategies be established in the oil and gas industry?**

The following four sub questions were used in investigating the main question.

RI1: What are the methods used by corporations to arrive at the formation of contracting strategy?

RI2: How are the major drivers for contract strategy formation identified, evaluated and ranked in importance and impact?

RI3: What is the impact of identifying each risk element in the respective contract types (Lump sum and reimbursable) and properly allocating the risks regardless of the contract type selected?

RI4: What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

As a result of rigorous, detailed and intensive analysis of the content of the responses, documents, and field notes, meaningful themes in the data were established through code development. Theses codes provided the opportunity to look for more common themes (Creswell, 1998). Based on this approach, matrices that were developed from responses to the questions (Miles & Huberman, 1994) are presented in figures and tables.

Based on the above, Nine (9) themes were identified in the data. These themes are both descriptive (how oil and gas industry contracts are being formulated and Analytical (why contracts are being formulated in this way). It covers the 'What', 'How', and 'Why' which are typical questions in a project management context. The nine themes emerge from a comprehensive analysis of some 100 pages of data. However, it is acknowledged that there are no authoritative rules on the number of

themes (Patton, 2002). The number of themes depends on the data, the research problems and issues. The themes were synthesised from the 'rich qualitative sources on which they were based' (Perry, 2002, p. 36) and depicted below.

Table 4.1: Research Issues and Findings

Research Issues (RI)	Themes	Findings
RI1	Theme 1.1 *(What, Why)*	**Finding 1**: Contract strategy formulation process is too lengthy and prescriptive hence the delay in establishing contracts for Projects.
	Theme 1.2 *(Why, How)*	**Finding 2:** The selection of a value for money contractor is the most practical option to reduce the cost of projects through Contracts
RI2	Theme 2.1 *(How)*	**Finding 3:** For the successful execution of a given contract strategy the alignment of Drivers between Contractor and Owneris crucial to ensure a common goal to deliver the project objectives.
	Theme 2.2 *(What)*	**Finding 4:** The risks of selecting a suboptimal contract strategy is very high due to National Oil Company or Joint Venture directives and interferences.
	Theme 2.3 *(How, Why)*	**Finding 5:** Corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non inclusion of some drivers in the contract strategy formation for projects.
	Theme 2.4 *(Why)*	**Finding 6:** Reimbursable contracts produce better quality work at lower cost than Lump Sum contracts but companies prefers Lump Sum Contracts
RI3	Theme 3.1 *(Why)*	**Finding 7:** The basic principles of risks allocation/assignment are not complied with in the allocation of Risks in a given Contract.
RI4	Theme 4.1 *(What)*	**Finding 8:** Personnel responsible for making Contract strategy decisions should have sound local experience which includes good knowledge of the local market and local stakeholders.
	Theme 4.2 *(What)*	**Finding 9:** Project Managers feels exposed to the risks of suboptimal contracts by not having experienced Contract professionals in the Project team.

Source: developed for this research

4.3 ANALYSIS OF THE RESEARCH ISSUES

This section presents the data that emerged from an analysis of each of the four research issues indicated in Table 4.1. This section is detailed because of the richness

of the data and many readers expect many details with empirical evidence from the one hundred pages of data collected (Eisenhardt & Graebner, 2007). A summary of the findings is in section 4.4 below.

4.3.1. Research Issue 1: What are the methods used by corporations to arrive at the formation of contracting strategy?

This research issue examines the current contract strategy formulation methods used by oil and gas corporations. This research issue is a critical step in establishing the current methods which will (1) contribute to constructing the framework of the current contracting strategy, and (2) ascertain what the current issues and gaps are in the formation of contract strategy hence establish the effectiveness of the current methods. It was also the intention of this researcher to learn from the rich experience of the project managers on how to put in place an optimal contract strategy.

Based on the analysis and interpretation of the data, two main themes arose for Research Issue 1. One of the themes relates to the 'what' and 'why'. The other relates to the 'How'. This research shall first examine the findings relating to the 'what' and 'why' theme.

Theme 1.1. The contract strategy formulation process

The first finding out of research issue 1 is that c**ontract strategy formulation process is too lengthy and prescriptive hence the delay in establishing contracts for Projects.** This finding can be looked at broadly in two main aspects. One is the process issues and the other people issues. The process issues deals with the number of organizationally prescribed steps to put a contract in place. While the people aspect of the finding looks at the issues with getting relevant skilled and experience contract personnel to manage the contract formation steps. The people issue is addressed in theme 4.1.

The steps involved in formulating the contracting strategy according to CS025 are as follows '… *(a) establish scopes and spend (b) develop strategy (c) develop tender*

package (d) tender (e) evaluate and award'. In addition to the above steps, CS028 stated that following the approval of the contract strategy '… *a contract tactics workshop will follow to establish the most effective tactics for realizing the objectives of the contract strategy'*. This process is heavily criticized by PMs as too lengthy and prescriptive. CS025 noted amongst others that the drawback of the current process includes *'… insufficient tender information, lengthy tendering process…, wrong strategy..., contract document poorly prepared…'*. CS028 added that the *'... time between strategy development and award is variable but is typically 2 to 4 years, by which time market conditions and the operating environment would have changed significantly'*.

In addition, CS031 a head of contract department, stated that '… *the contract process is probably as clear as mud …'*. Other respondents such as CS009, Operations engineer with over 33 years industry experience, noted that the '… *C&P (i.e. Contract and Procurement) strategy development: is more a tick in the box exercise rather than a fit for purpose solution'*. Similarly, respondent CS034 (Project Services Lead) in reference to the end-to-end process steps and the required activities to establish a contracting strategy stated that '…it is *taking too long to arrive at firm conclusions...., taking too long to approve and award execution phase contracts'*. Hence a 'suboptimal contract strategy' is used from the start of the project.

The importance of timely establishment of a contracting strategy was further highlighted by CS008. He stated that '… *it is very important that as much effort is put into early contract strategy and planning as soon as is possible'*.

A review of each of the steps listed above by CS025 on the formation of contract strategy to determine which of the activities could be contributing the most to time wastage or delay shows as follows:

A. Establishing the scope of the work using the organizations approved process is a major challenge. The choice of the contract strategy to be used depends on the completeness of the scope of work. Using NVIVO queries, this research carried out key word search for 'Scope'. The main reason for doing this was to find out from

project managers if there were any issues with scope definition. It was found that words such as time, unclear, inadequate, poor, proper, incomplete, change, creep, growth, well-written, and well-defined were used as leading adjectives or trailing words to qualify 'scope'. Out of the 89 times that the word 'scope' was used in the responses, it had one of the above words in the same sentence 58 times (65%). This is a clear indication of the concerns and issues relating to scope definitions and clarity of scope. Some of the respondents were very particular about the time required to define a firm scope of work. CS029 in his response implied that one of the checks should be whether sufficient time has been invested in defining scope of work; '*… have I invested time to come with clear scope of work?'*

Another comment which is very critical to this discussion was raised by CS041 on the need for *a '… Well written and complete scope of work'*. However important this two comments are. One of the major challenges which corporations face is the lack of adequate and experienced personnel to prepare the scope of work and also manage the work. Hence it is not uncommon to see contractors and owners selecting contract strategy based on lack of clarity / incompleteness of the scope of work as in the example given by CS014: '*Inadequate scope development does not favor fixed price contracting ... the advantage of the reimbursable contract is that you can work with poorly defined scope'*.

B. Pre-selection of contractors is a very important step in the contractor selection process. The pre-selection exercise is aimed at producing a short list of contractors that a tender package will be issued to as part of the tender process for bidding. In some organisations, this step is called pre-qualification (PQ). The major objective of the prequalification is to save time in evaluating tenders since only bidders that have been shortlisted will be invited to bid. Asked to provide some pros and cons of the practices by some companies to prequalify vendors and contractors: 14 (56%) out of 25 respondents, criticised the practice of pre-qualification as complex, time wasting resulting in schedule delay, lacking quality and information required to properly conduct the exercise, lack of experienced personnel to carry out the exercise, and in some cases, prequalification is not allowed by some National Oil Company (NOC).

Table 4.2 contains responses given by project managers on the practices of prequalifying contractors and the meanings deduced from the quotations.

Table 4.2: The practices of prequalifying contractors

Respondent	Role/Position	Quotes	Conclusion / Meaning
CS027	Engineering Manager	*.. PQ (PreQualification) questionnaire is not in simple and easy to follow language ... and it is a challenge to compile such a questionnaire*	Complex
CS036	Contract Engineer	*... In some cases, pre-qualification not necessary. Where used, it should be focused ... on project specific issues, pre-qualification is rather based on general competence.*	Not required
CS023	Discipline Engineer	*...Prequalification not required.....*	Not required
		...access to all information required in proper contractor pre-qualification...	Lack of information
CS001		*pre-qualification not done thoroughly enough.*	Lack of Quality
CS028	Snr Lecturer	*... rigorous pre-qualification of bidders ...*	Lack of Quality
CS003	Operations Engineer	*process needs to be supported by experienced personnel from 'COMPANY X' side, not by people new to the position.*	Lack of experienced Personnel
CS005	Team Leader Cost	*... Previous work record looked in at pre-qualification/technical evaluation phas.*	Lack of information
CS021	Project Manager	*... will avoid some of the pre-qualification and tendering that we have to go through for every project and should help avoid schedule delays.*	Time Delays
CS011	Project Manager	*risks of eliminating good contractor during the pre-qualification.*	Lack of Quality
CS031	Head Contracts	*Elements included in the pre-qualification are usually not defined properly. Process is also not clearly routed.*	Lack of quality
CS036	Contract Engineer	*failure to focus the pre-qualification on project specific issues, pre-qualification is rather based on general competence*	Lack of quality
CS017	Contract Team Leader	*Based on ...(NOC) procedure, prequalification of bidders via certain set of criteria is not allowed.*	NOC/JV Directives

Source: developed for this research

The intention of the practice of pre-qualification in the selection of contractor is aimed at proving '*... that the Contractor is capable to do the work in the first place'* (CS004) *and '...saves time in the final evaluation of the bids'* (CS006). But *'the challenge and pressure to get the pre-qualification right … for example a team may be required to carry out ... 12 rounds of pre-qualifications ... consisting of in excess of 200 clarifications'* (CS012) will surely impact on the time to complete the selection of the contractor and also the quality of the exercise. The challenge is even more daunting with only very few competent and experienced contract personnel in the owner's team.

The next step in the process of contract formation is the tendering of the work packages to preselected contractors. Out of a total of 25 respondents, 28% believe that this process requires improvement. The main criticism of the process of tendering are as follows: *'Insufficient tender information, lengthy tendering process, ..., and Inefficient tender board process'* (CS025); *'late tender planning and slow turnaround of tender circulars in response the queries and clarification requests'* (CS041), and *'poorly presented project supply chain council or tender board paper'* (CS041). Other issues include the *'competence of members of Project Supply Chain Councils and Tender Boards',* (CS041), and *'... the time required to tender the work...'* (CS015).

As seen above, one contributing factor to the lengthy tender process is the lack of experience and competence in the owner team, both in the preparation of the tender papers, simplifying the tender process, and in making decisions in the tender board or Supply Chain Council.

In conclusion, it can be seen that corporations have processes for the formation of contracts. These processes are complex (described by one PM as "clear as mud") and also very prescriptive. The major limitation for the PMs is the amount of time and effort required to put a contract in place. Some of the steps in the process of formation of a contract are not necessary but required to be complied with by the corporations. This not very efficient requirement contributes to the delays in establishing a contract as well as lead to the selection of suboptimal contracts. The PMs are also affected by the lack of experienced contract professionals. Finally, it is still not known how PMs utilise this prescriptive framework.

Refer to appendix D for some illustrative quotes / extracts captured from email interview respondents.

Theme 1.2. The contract selection criteria

The second finding out of research issue 1 is that **the selection of value for money contractor is the most practical option to reduce the cost of projects through Contracts.** This theme is related to the 'why' and 'how' themes of the contract strategy formation. It explains 'why' the costs of projects are high, and 'how' the selection of lowest bidder contractor could result in high cost. Project Managers and indeed corporations are concerned about the high cost of capital projects. The selection of the most appropriate contracts (optimal) also includes the selection of the best placed and qualified contractor to execute the work. A contract strategy cannot be complete if it doesn't consider all aspects of the contracting process from how to select contractors to how to close out the contracts (Hartman 2003). Once the scope of work has been agreed and the tender approved by the Supply Chain Council, the successful delivery of the work package is in the hands of the selected contractor. Hence this process of ensuring that the best available contractor is selected is critical.

The decision of which contractor to engage is based on a number of factors dictated by the current practice in the corporation. It is required that the successful contractor should be selected through a competitive tender. The successful contractor will be the one which meets the set criteria and prove to be technically qualified and commercially the lowest bidder. This practice is seen as a way to select a technically good contractor but yet come in at a low cost. Based on the experience of project managers, '*Lowest bidder is not always cheap in a lifecycle cost...'* (CS026). Similarly, CS025 summed up his experience of working with a lowest bidder contractor as '*... lack of competent personnel, inadequate tools/equipment and contractor's staff complained about low salary …'*. In addition, CS036 stated that*: 'lowest bidders: cut corners/quality of work, look for every possible change'*. Based on the above, it is apparent that Project Managers recognize that being the lowest bidder does not mean that the project will be completed at a low cost and good quality. The Project managers also recognize that there are various reasons why the bid may be low. One of the reasons given by CS013 is that the lowest bidder price may be low because '*… he did not fully understand the scope of work, … have priced the scope of work incorrectly… as he is inexperienced with the type of project … Or … coming in low, just to win the job, and then later on recover his costs via*

aggressive claims'. In supporting this statement, CS018 gave example of a plant in Buenos Aires where *'...a very special membrane filtration unit failed twice, because it was from a cheaper supplier rather than a proven one'*.

Based on the above, this research carried out further detailed analysis of the data to confirm the concerns of project managers on lowest bidders. Project Managers share the same opinion about lowest bidding contractors. Based on responses from 15 respondents that answered the questions which compared lowest bidder versus value for money contractor, 12 (80%) expressed the following concerns:

Table 4.3: Attributes of lowest bidder contractor

Responses	Interpretation/Attributes
✓ *Low salary to staffs*	Low morale
✓ *Low efficiency and productivity, not a good contractor.....*	Low efficiency and productivity
✓ *Estimates might be bid to low to get the job*	Desperate to Secure the job
✓ *Lowest bidder has come in low because he is desperate for ...*	Desperate to Secure the job
✓ *Vendors always bid low in order to secure a....*	Desperate to Secure the job
✓ *Or is he coming in low just to win the job*	Desperate to Secure the job
✓ *Or is he coming in low because he did not fully understand the scope*	Do not understand scope, changes/variations
✓ *Or is his price low because he did not fully understand the scope*	Do not understand scope, changes/variations
✓ *.... are they buying the work on potential for Change*	Do not understand scope, changes/variations
✓ *Lowest bidder is not always cheap in a lifecycle cost when ...*	Expensive/Costly
✓ *... is always costly to have cheap contract initially but a lot....*	Expensive/Costly
✓ *.... may not be as technically competent for the job as a.....*	Incompetent
✓ *... cut corners/quality of work, look for every possible change ...*	Low efficiency and productivity

Source: developed for this research

Using NVIVO word count, the number of responses which matches one or more of the following attributes of a lowest bidder were further tabulated based on frequency of each related answer. The attributes are: Low staff morale, Low efficiency and productivity, desperate to secure the job, scope understanding/changes to scope, expensive/costly, and incompetent. These attributes were deduced from the above quotes. The table below shows the percentage of the number of respondents that agreed with one or more of the attributes.

Table 4.4: Statistical analysis of the attributes of a lowest bid contractor

Respondent	Low staff morale	Low efficiency and productivity	desperate to secure the job	Do not understand scope, changes / variations	expensive/costly	Incompetent
Response %	14%	21%	29%	64%	64%	36%

Note: the total number of respondents for this analysis is 15.

Source: developed for this research

As seen in the analysis above, a majority (64%) of the respondents agreed that the lowest bid contractor do not understand project scope. Lack of understanding of project scope could lead to inaccurate pricing of the work. CS013 supported this statement. He stated that the lowest bid contractor may have '… *priced the work incorrectly (in this case too low) as he is inexperienced with the type of project…'* A very important findings of the analysis is that most of the respondents that stated that the lowest bidder may not have a good understanding of the scope, also suggested that the lowest bidder may have intentionally priced low so as to secure the job.

The above suggestions *'intentionally priced low'* further implies that the lowest bidder may have hidden plan/information to recover cost and make profit through '*aggressive claims'* (CS013). This action further confirms the theory of adverse selection. The owner may decide to seek 'value or truthful' information. But within the dictate of the company prescribed contract framework. Hence, he is forced into selecting the lowest bidder to comply with corporate policy. Another point worth mentioning is the fact that 36% of the respondents associated the lowest bidder contractor with not being competent and low staff morale. One of the respondents (CS025) stated that where lowest bidder is selected, '… *problems start to develop during contract's execution e.g. lack of competent personnel ... and contractor's staff complained about low salary'.*

There is a strong correlation in the data between those respondents who suggested that the lowest bidder does not understand the scope, and that the lowest bidder is more expensive and hence high cost. On a one-to-one matching of the responses,

67% of respondents shared this view. CS031 warned that *'…very often these bidders turn out to be not-so-lowest-cost contractors'*. In addition, CS030 also stated that '… often the lowest bidder may end up being more expensive'. This is supported by the analysis in the above table; where over 64% of the respondents stated that the lowest bidder is expensive and costly.

On the other hand, the selection of a value for money contractor is seen as the most practical option to lower the high cost of projects. CS029 defines value for money contractor as a contractor who can ensure that *'… the money you pay to the contractor is commensurate to the technical merits and quality of work being delivered'*. In addition, he stated that *'… the best value for money contract is the one that emerged from the competitive bidding…and demonstrates value for money through establishing a competitive price'*. In order to ascertain the value add through cost reduction by selecting a value for money bidder, the company estimates must be established taking into considerations the total cost of ownership (TCO) *versus* the initial capital expenditure (CAPEX) cost (CS011). According to CS026, *'value for money bidder may seem expensive at first glance, but the TCO will throw lights on the lifecycle cost'*.

The main advantages of the use of value for money contractor includes*: '… more control, more transparent, better quality work…'* (CS036); *'… safely, timely and within budget … with no claims and variations…'* (CS025). Where timely establishment of a contract and the speed of delivery of a project has become critical success factor for the project*,* 'then the value for money contractor should offer project managers the "best value proposition" (CS041).

Whilst value for money contractor may be the *'… most preferred option…' (CS037)* by project managers, CS020 stated that there is always *'… high pressure from project developers and financers to go for the lowest price'*. This statement is supported by CS028. He added that *'… JV partner directives also introduce stringent conditions for deviating from the lowest bidder approach'*.

Despite the overwhelming support for the use of value for money contractors, some project managers still believe that not all work should be executed using value for money contractors. For example, CS030 is in favour of using lowest bidder contractor for *'… a small, simple short project'*. This type of work, he said *'… could easily go to the lowest bidder'*. This suggestion does not change his preference to use value for money contractor for 'larger and more complex projects'. He stated that for larger projects, *'… it is important that the bidder has fully understood the work scope and often the lowest bidder may end up being more expensive'*.

The concept of 'sub-optimal' contract strategy was also discovered in the analysis of the data. This concept was used to describe the type of contracts put in place through the selection of lowest bidder. Some of the project managers advised against the use of 'sub-optimal contract strategy' (CS028) because a contract that is not optimal will lead to '… *scope creep and cost increase through multiple changes'* (CS030). In addition, there will be a lot of overhead to manage this type of contract hence a large owner team may be required (CS021).

The warning given by CS007 on the selection of lowest bidder contractor cannot be overlooked in closing out these findings. He stated that with lowest bidders executing your work, 'the joy of a discount will be long gone over the joy of quality'. He further warned, '*always be careful with this. Is it quantity or quality you're after?'* Hence, if one is looking for quality and the 'most cost-effective' (CS002) contractor, then value for money contractor are the only option. Therefore, it is correct to conclude that the lowest bid contract *'…does not necessarily mean the … lowest price*' (CS001) and also the lowest bid '… *does not usually offer …' the best value proposition*' (CS041).

In summary, the data further confirm three of the attributes of an optimal contract strategy which is (i) the use of value for money contractor, (ii) the need for quality (valued or truthful) information, and (iii) the use of trust and relationship to ensure efficient contract management. The data also throw more light on the attributes of a value for money contractor. This attributes includes – quality work, no scope creep,

low changes, lack of disputes, good and competent workers, trust, and good relationships.

Refer to appendix E for some illustrative quotes / extracts captured from email interview respondents.

4.3.2. Research Issue 2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?

This research question examines how the drivers used for the formation of contract strategy are identified, evaluated and ranked in importance and impact. The need to have well designed drivers for a project was examined in detail in the literature review (see Chapter 2). The drivers, amongst others, enable the owner to develop an effective payment terms, identify the behaviour to incentivize, and the type of contractors required to do the work. Hence tailor the tender package to attract a value for money contractor. These attributes are some of the main characteristics of optimal contracts which here listed in chapter 2 (section 2.5). Furthermore, little is known about how project managers utilise the prescriptive framework or the operating contingencies that influence how project managers interpret this prescriptive framework. It is the aim of this research issue to further establish how the prescriptive framework is used and also how PMs select the drivers used in the formation of contracts.

The questions used to solicit response on this research issues were aimed to establish drivers used for contract strategy selections, methods of identifying, evaluating, ranking the drivers, and driver identification and selection related issues. Three main themes and findings were discovered in this analysis. The themes points to the 'How', 'What', and 'Why 'derived through findings 2.1 (the alignment of drivers between contractor and owner is required to ensure a common goal to deliver the project objectives), findings 2.2 (the risks of selecting a suboptimal contracting strategy is very high due to National Oil Company or Joint Venture directives and interferences), findings 2.3 (Corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non-inclusion of some drivers in the contract

strategy formation for projects), and findings 2.4 (Reimbursable contracts produce better quality work at lower cost than Lump Sum contracts but companies prefers Lump Sum Contracts). Each of the findings is examined below.

Finding 2.1: Project Objective – alignment of project goals

The third finding of this research project is that **the alignment of drivers between contractor and owner is crucial to ensure a common goal to deliver the project objectives.** This finding was discovered in the process of identifying the main drivers for the selection of contract strategy. Based on the analysis, there were patterns in the examples given by respondents which suggested that the contractors had different objectives from those of the projects. Though in real life this is not unexpected, it is worth checking to what extent the unaligned drivers or objectives have affected the successful delivery of the project.

A close look at some of the examples given by the respondents such as CS020 showed that Project Managers are concerned that their expectations are not met as a result of the non-aligned objectives of the contractors. This discovery is supported by CS009. He described the situation as *'… no trust and professionalism, different agendas...'. CS009 also cited '...different values and norms...'* as issues resulting from the non-aligned objectives. CS020 gave the following example of his experience to buttress his point. In his example, he stated that *'the contractor chose (obviously) for the cheapest suppliers and equipment, meeting the specs but often not our expectations'*. He also stated that the *'… HSE-culture difference between … contractor and … standards would have been obvious'* if the objectives of the owner and contractor were aligned. The need to ensure that objectives of the owner and contractors are aligned is further supported by CS015; he warned that *'Any mismatch can lead to friction which will then detract from the completion of the work'*. The recognition that contractor/owner processes could be different is supported by CS010; *'...sometimes there are different process methods with licenses owned by different companies'*. But in preparing the contract, CS023 advised that the 'contract plan should be clear on the business objective'.

Based on the detailed analysis of the data, it was discovered that Companies are taking steps to align the objectives of the owner and contractor in the formation of contract strategy. Pre-qualification of contractors in the selection process gives the owner opportunity to ensure that the contractor has the capacity and resources to deliver. It also gives them the opportunity to check that their objectives are indeed aligned. However, the exercise of prequalification has been criticized by project managers as a 'tick in the box…' (CS009) and '…is not done thoroughly enough' (CS001). Whereas, if done correctly, issues such as '… cultural differences' (CS020); '…previous work record of the contractor…' (CS005); and their ability to deliver to '…expectations' (CS009) would be addressed.

Similarly, it was discovered that the attitude of engineers towards contract strategy formation is one of the reasons for the lack of alignment of owner/contractor objectives. This statement is supported by CS009. He stated that '*the contract is perceived as a means rather than a vehicle, attitude that ambiguity can be opportunistic, done in isolation ... disconnect between commercial, legal and project team'*. The above statement correctly tell the story that very little effort is put into establishing a contract let alone drive getting an optimal contract. This attempt to create such ambiguity leads to Projects not investing time into ensuring that the contract drivers are aligned and that an optimal contract for the project is put in place. This can be easily explained using the previous argument that project managers are busy and lack the expertise in contract to be able to fully support the contracting strategy formation process. Furthermore, the above statement further confirms the findings from the literature review, that the size of the contract is proportional to the ambiguity in the contract: the larger the contract, the greater the ambiguity in it (Kerzner, 2001). These ambiguities are also stated as the reason why contracts are not complete. Hence, suboptimal contracts are used in the execution of projects.

The need to maximize 'Profit' has been cited as the common reasons for the non-alignment of the contractor and owner's objectives. This is supported by CS024, '*it is*

always very difficult to forget that contractor has a different objective i.e. making as much profit from the contract'. Some of the respondents suggested ways to handle the 'maximization of profit' while ensuring that the project objective is aligned. CS005 suggested the inclusion of '...Profit/overhead margins' in the contract. CS030 suggested '… establishing a partnership ... for a share of the profit'.

In conclusion, the alignment of objectives will certainly increase 'trust and strategic fit' which according to CS009 '...will be the underlying forces of the success of the strategy ...'. Similarly, other suggestions given by project managers include '...alliancing/partnering with key contractors' (CS027) and 'long-term working relationship' (CS024). These are key attributes of optimal contracts identified in section 2.5 of the literature review. It should be emphasized that in the data analysed, there were no evidence pointing to how the drivers for the selection of contract strategy is identified or selected. The body of knowledge and the theory of contracts made it very clear that 'most relevant' variables are selected in the formation of contracts. How are these variables identified and ranked or selected in the current contract formation? Or does the prescriptive nature of the framework stops the PMs from identifying the variables?

Refer to appendix F for some illustrative quotes / extracts captured from email interview respondents.

Findings 2.2: Impact of NOC and JV Directives on Contract formation (key word finding)

The fourth finding of this research project is that **the risk of selecting a suboptimal contracting strategy is very high due to National Oil Company or Joint Venture directives and interferences.** This theme is the 'Why' resulting from the findings based on the analysis of the responses which relates to how the drivers for the formation of contract strategy are identified, ranked and managed. This finding was discovered through the prevalent concept which emerged in which it appeared that

some policies and processes in the formation of contracts and the selection of contractors were not in the controls of the corporations and the project managers. Keywords such as 'imposed', 'forced', 'directives', and 'interference' were used in some of the responses. Hence the sentences in which these words appeared were further examined to ascertain their impact on contract strategy formation. Though the frequencies of occurrence in the usage of these key words were not very high, but the resulting impacts were 'show stoppers' or 'infringing on license to operate'.

Based on the analysis, it was discovered that in all instances where national oil company (NOC) / partners directives were given, the corporations and project managers were required to comply. This mandatory compliance leads to setting aside the corporate policy for contract strategy formation which resulted in the selection of new and inexperienced contractors with some consequences for the corporation and project. The latter statement is supported by the following extracts (not paraphrased) from the responses:

'The local companies especially the newcomers are still new to 'COMPANY X' rigorous and high 'COMPANY X' safety standard. They also lack skilled management to oversee the complex multi facets of oil and gas projects. Due to the company commitment to the government to develop local companies, the company has no choice other than holding their hand for them to start off the process' (response by CS024).

The consequences of the above for corporations are that they commit to use a very inexperienced contractor to build a mega and complex oil and gas project, thereby risking the company's reputation with very high chances of failure. CS018 gave example of a Plant in Germany that was managed by an incompetent contractor which *'…was imposed by management from the US'*. The result of this action was *'…delay and …cost overrun'*. CS036 also gave example of the consequences where Corporations were forced into selecting *'…new/unfamiliar contractors to ... standards/processes'*; the owner had to *'… offer own manpower to supervise them and handhold…'*. This also has its resultant implications considering that the owner

do not have experienced contract personnel on the project. Based on my experience in one of the Asia countries, I can collaborate this finding with a real life example where an inexperienced contractor was forced on one of the corporations to execute a deep water project. The owner 'scrambled' its resources from deep water projects around the world to handhold this contractor. This resulted in the risks of delay and cost overrun for the project; and the learning curve for the contractor was very steep.

It was also discovered that the need to comply with National Oil Company or Joint Venture directives and interferences do lead to setting aside corporate policy for contract strategy formation with consequent impact on the type of contract or contractor selected:

'Under the PSC (Production Sharing Contract) environment in …, 'COMPANY X' has to obtain NOC approval for all contracts and procurement cost. Each contract shall have its own approved contract value (ACV) for project teams to execute the service via this contract. Therefore, using reimbursable contract, it will be difficult for 'COMPANY X' to establish the ACV and subsequently request NOC approval. This is not the preferred type of contract from NOC point of view (response by CS017).

The above statement is further supported by responses which points to the fact that Corporations policies are not used in the selection of contract strategies where there is corporate directives. Example: CS017 wrote: *'…based on NOC procedures, pre-qualifying of bidders … prior to tender is not allowed'*. This is also supported by CS024, *'prequalification of local companies is a very sensitive issue as the local companies are supported by the government shareholder representative of the board'*.

As seen above, these directives have serious consequences for the project and the type of contract that is selected. CS028 pointed out that: *'JV directives on contract strategy which sometimes ignores serious risks or unrealistically transfers these risks*

to contractors' as the main reason for improper allocation of risks. CS026 further stated that where JV directives lead to the wrong contract decisions, *'… the Owner Company bears most risks and pays for all mistakes contractor made. Budget and schedule overrun is anticipated'*. But owners are expected to mitigate or manage these risks. Commenting on schedule overrun, CS005 stated that *'…some schedules are dictated by politics or client desire and not based on a realistic schedule'*. CS002 do not understand why NOCs challenge project managers that Project cost are not 'fit for purpose' whereas project managers are *'…directed down this route via the business objective of satisfying the Owner's (NOC) aspirations for technology and capability transfer'*.

Similarly, NOC/JV directives and interferences also lead to Project delay and additional complexity to the process of contract strategy execution. CS017 gave example of waiting indefinitely on NOC to approve contracts. *'... change of works that have an impact on the commercial or contractual obligation could be considered as challenging ... if this occurs, a change to contract paper has to be raised and presented to a number of Committees, including...(partner)... for final approval. Upon completion of the presentations ...we have to wait for final ... (partner)... approval, which does not have any specific time frame for the authority to do so...'.*

There are also additional challenges which work against improving contract strategy formation resulting from NOC interferences. One of those challenges affects company desires to 'book in contractors'. According to CS017, '... (NOC) prefers a competitive, fair tender for any new or replacement contract'. As a result, CS002 confirmed that in some countries, *'...Contract Strategies have remained the same for the last 3 years…these are typically aligned with the Owner's (NOC) aspirations…'*. Therefore, the call by some project managers to form alliancing/strategic partnership with some contractors will not be accepted in this type of environment. In the literature review, the ability of the owners to 'book in contractors' was seen as a practical solutions to addressing the gaps in not having competent contractors with the required capacity to deliver the work. Whilst most literature stated that the ability of the owner to predict volume of work was a major challenge to strategic alliancing,

it was not immediately obvious that government / NOC directives was equally a challenge. Hence, one of the main attributes optimal contracts which is 'Long term Commitment and renegotiation' cannot be achieved under current prescriptive contract strategy framework used by corporations.

Further implications of government or NOC directives are summarised in the table below. The table contains a summary of the extracts where the keywords such as 'forced', 'directives', 'imposed', 'interference' were used including implications on contracts, projects and Corporations:

Table 4.5: Implications of government or NOC directives on optimal contract strategy

Respondent	**Location of Respondent**	**Extract from Statements made by Respondents**	**Implications on Contract and Project**	**Implications of not complying with JV/NOC/Government Directives**
CS028	Africa/Middle East	'JV (Joint Venture) directives on contract strategy … ignore serious risks or unrealistically transfer these risks to contractors'.	• Corporate Contract Strategy formation process set aside • Drivers not identified, ranked or used in the contractor selected • Risks not properly identified, allocated and managed • Owner bears all risks and pay for all mistakes made by the contractor (CS026)	• Withdrawal of licence to operate • No funding for project (Show Stopper) • Strained Relationships • High cost of project
CS028	Africa/Middle East	*'JV partner directives also introduce stringent conditions for deviating from…'*	• Corporate Contract Strategy formation process set aside • Introduce inflexibility in the	• Withdrawal of Licence to Operate • No funding for project (Show Stopper) • Strained

			selection of contracts. • *'…huge burden...'* and delays to get approval for deviation	Relationships • Delay to Schedule
CS018	Europe	'… *The selection was imposed by management from the US'*	• Corporate Contract Strategy formation process set aside • Incompetent contractor selected • Delays and cost overrun • Owner bears all risks and pay for all mistakes made by the contractor (CS026)	• Withdrawal of Licence to Operate • No funding for project (Show Stopper) • Strained Relationships • High Cost of project
CS031	Asia	*'…often costed into any lump sum job anyway in case they are imposed'*	• Increase in the cost of contract and project • Wrong contract selected • Owner bears all risks and pay for all mistakes made by the contractor (CS026)	• Withdrawal of Licence to Operate • No funding for project (Show Stopper) • Strained Relationships • High Cost of project
CS012	Asia	*Interference from NOCs…'*	• Corporate Contract Strategy formation process set aside • Incompetent Contractor selected • Owner bears all risks and pay for all mistakes made by the contractor (CS026)	• Withdrawal of Licence to Operate • No funding for project (Show Stopper) • Strained Relationships
CS021	Asia	*'the main challenge is ensuring that local contractors are fully competent… as we are forced to*	• Incompetent Contractor selected • Drain on Owners' resources to supervise and train contractor • Owner bears all	• Withdrawal of Licence to Operate • No funding for project (Show Stopper) • Strained Relationships

		use local contractors'.	risks and pay for all mistakes made by the contractor (CS026)	• High Cost of project

Source: developed for this research

As seen in the table above, the practice of imposing contractors on corporations seems to be more common in Africa/Middle East and Asia regions. However, there is no evidence in the data to confirm the reasons for this observation. However, in all instances where forced, imposed, or directive were used, it was also obvious that the main driver was to get a local contractor employed as part of the NOC Local Content policy. Hence, it can be concluded that local content development is one of the main drivers why NOCs impose suboptimal contracts on projects. This finding is significant hence should be included as one of the attributes of optimal contracts.

The potential implications of not complying with JV/NOC/Government directives are derived from the findings detailed in previous sections in the data analysis. The summary of the implications of being 'forced', or 'directed' or have a contractor 'imposed' on the project manager includes amongst others setting aside the corporate policy for contract strategy formation which includes non-identification of main drivers and risks; Mistakes in the execution of the work including delays and cost overrun due to the use of incompetent contractors. There are also potential impact/consequences for disobeying 'NOC' or Government directives or instructions. These includes the withdrawal of licence to operate, No funding for project (show stopper), strained relationship which could affect future work, and high cost of projects. In some cases, this lack of support can be very frustrating for the International Oil Companies (IOC) which could result in moving its operations out of a country. Recently, Exxon Mobil was reported to have moved its operations out of Iraq due to unfavourable Government directives which had a very significant impact on its ability to operate at a reasonable profit margin.

Refer to appendix G for some illustrative quotes / extracts captured from email interview respondents.

Findings 2.3: Corporate policy prescribe drivers for formation of contracts (key word finding)

The fifth finding of this research project is that **corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non-inclusion of some drivers in the contract strategy formation for projects.** This finding deals with the theme 'how' corporate policies prescribes drivers for contract strategy formation and the theme 'why' project managers sees these processes and procedures as rigid and inflexible. In studying this theme, a key word search for 'procedure', 'policy' and 'processes' were carried out in NVIVO. These key words were examined where used in association with contract strategy formation. A pattern soon emerged in which a total of 28 respondent out of 51 (55%) expressed some concerns when describing the disadvantages of the contract selection activities. It was also noted that some of the corporate policies (process/procedures) were put in place in order to meet the external/partners requirements. Hence, there is mandatory compliance resulting in inflexibility for the project managers in their attempt to establish optimal contracts.

First, this research examined the 'how' aspect of this finding. In this finding, it was discovered that a large number of respondents support the findings that corporation imposed limitations in identifying and selecting appropriate drivers for the formation of contracts. There were also examples, where corporation impose contractors on project managers. CS018 supported this by citing *'… delays and cost overrun caused by incompetent contractor whose ... selection was imposed by management'*. As already highlighted in findings 2.2, there are also cases where corporate policy is influenced by the need to comply with external stakeholders/partners' directives which leads to rigid processes and procedures for contract strategy and for the

selection of contractors. CS024 supports this finding by stating that *'… due to the company commitment to the government to develop local companies, the company has no choice...'* than to use new/inexperienced contractors in order to develop them. This is in itself a challenge considering that companies do not have experienced contract professionals in their team to carry out the required level of supervision and handholding. In the above cases, it is clearly seen that the contract strategy drivers are not used in the selection of these contractors. Instead instructions and order from management was followed.

Corporate policies are translated into processes documented in procedures. Project Managers are required to comply with these policies by strictly implementing the procedures in setting up contracts. Based on the responses and analysis of the data, these processes and procedures were heavily criticized by project managers as too rigid and complex. CS024 supported this statement by describing the current processes as *'…too rigid procedure to maximize contractor potential in realizing projects'*. The corporate procedures also prescribe the type of contracts and when to apply them. CS023 gave examples to support this statement *'…upstream use reimbursable…, … LNG (Lump Sum), Downstream large projects (lump Sum), smaller less than USD$20 reimbursable… or site alliance target cost contacts'*. This example is further supported by CS030. He stated that EPC (lump sum) is used for large projects *'…LNG construction, reimbursable for smaller less defined contracts'*. Due to the complex and rigid nature of these procedures, CS041 said that *'...expecting a range of different participants to follow processes such as the Contractor selection and management process just isn't working'*. CS015 further said that: *'...significant effort is required to get this (i.e. process of prequalification) right'*. He further advised that project managers *'…must not be scared to say 'no' to a contractor if we have good reason'*. The fear of being punished for non-compliance or violating company instructions is no doubt a unique factor which influences the selection of Contractors and hence suboptimal contracts.

Other concerns raised by project managers include the time and effort required to understand and implement the policies which according to them are complex hence project managers requires guidance from professional contract personnel to

implement the policies. This statement is supported by 12 out of 28 (43%) respondents to the questions on areas of contract strategy formation requiring improvements. Short extracts from the supporting statements are as follows: CS031, *'....Process is also not clearly routed...'*; CS013, *'.... this process can be time consuming and costly'*; CS036, *'... lengthy process for signature of secrecy agreement'*; CS025, *'...main issues ..., lengthy tendering process'*. The lack of clarity and complexity of the company policies also directly affects contractors who according to CS031 *'very often contractors approach the contract holder straight on in the bid to shortcut the process'*.

Some of the respondents gave examples of areas in contract processes to be improved. CS010 stated as follows, *'the conjunction between Project Governance Process and Procurement Process...'*; CS029:*'...tender, bid and evaluation process'*; CS024:*'...tender Board process can be made efficient and delegated to accountable panel...'*; CS003: *'... the process needs to be supported by experienced personnel ..., not by people new to the position'*. CS041: *'... return to the practice where the professional Contacts Manager or Engineer assigned to the Project, guides the Project Manager through the processes'*.

Despite the criticism levied by Project Managers at the company policies of contract strategy formation and selection of contractors, Companies find themselves in a position where they cannot make any improvements. CS036 asked the question: '*...if you know that only one or two contractors can do the jobs, why still apply the whole process?'*. The answers to this question can be easily derived from the foregoing analysis. The first answer is that company is constrained by stakeholders/government/partners to implement their policies/drivers in the selection of contracts and contractors. Hence a contractor can be 'imposed' on the Company. Another plausible answer is the 'fear' of non-compliance with company policies hence Project Managers are forced to accept policies and contractors 'imposed' on them by company. Closely related to this answer is the fact that Project Managers do not have sound experience of contract strategy formation. There are also shortages of experienced contract professionals to guide the Project Managers.

This lack of experienced PMs and Contract professionals has led to the call for *'…simplification / standardization…'* by CS036 and other Project Managers. This call is very strong considering that the current corporate policies is very rigid, prescriptive and do not take into considerations issues such as world markets, current company philosophy, policy and strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues in the selection of contracts. These observations further confirm literature findings that corporations do not use the product of consideration of issues such as world markets, current company philosophy, policy and strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues in the formation of contract strategy. Hence this research carried out a more detailed analysis to ascertain the popular drivers used by corporations in contract strategy formation.

The table below establishes the current understanding of the popular drivers used in the formation of contract strategy.

Table 4.6: The popular drivers used by corporations in contract strategy formation

Source: developed for this research

In the current practice of contract strategy formation, the most popular drivers used are schedule, cost, risks, and market scenario. Quality, local content, scope definition, safety, location, project size, NOC/JV/Partners/Government objectives and directives are in the second most popular group. In real life, the drivers in the second most popular groups are taking as a 'GIVEN'. This means that they must be taking into consideration in the selection of contracts. However, based on the foregoing analysis, it is now very obvious that the products of drivers including those in the first, second and third popular groups are not taking into considerations and their selection is largely influenced by the key stakeholders.

In conclusion, based on the foregoing analysis, it is apparent that there is a further need to align the objectives of the key players in setting up contract strategy. The key players - project managers, partners/government, and corporation all seems to have different voices in the formation of contract strategies. Not only should the '*conjunction between Project Governance Process and Procurement Process'* (CS009*)* be improved, there is also the need to ensure that the drivers of the respective JVs/NOC/Government, Projects, and Corporations are aligned and taking into considerations in the selection of contract strategy. This is in line with the advice by CS009 in which he stated that key players in the contract strategy formation should have the *'...ability of understanding and acceptance of driver of others...'*. The current process where these objectives are prescribed in corporate policies and procedures removes the flexibility for PMs to analyse the drivers, rank them and select the drivers. This additional observation further confirms the literature finding that 'aligned (owner and contractor) objectives' as an attribute of optimal contract.

Refer to appendix H for some illustrative quotes / extracts captured from email interview respondents.

Finding 2.4: Reimbursable contracts vs. Lump Sum contracts (key word finding)

The sixth finding of this research project is that **reimbursable contracts produce better quality work at lower cost than lump sum contracts but companies prefer lump sum contracts.** It has been established in the foregoing analysis that there are different voices and interest which dictates the drivers to be used in the formation of contracts. But in the course of the analysis of data, it was discovered that PMs also hold opinions and preferences on the type of contracts to be used in projects. This preference is based on the PMs belief that they require more insights on the work being executed, more controls, and more flexibility. This belief was deduced from the advantages of reimbursable contracts and hence the reasons why project managers prefer this form of contract over lump sum contracts. This finding seeks to establish why companies prefer lump sum contract over reimbursable contracts despite the advantages of reimbursable contracts. This finding was discovered in a review of the various contract types to determine the most popular contract type used by project managers. Using NVIVO key word search, the frequency of each of the contract type named by a project manager was recorded and tabulated below.

Table 4.7: Number of times a PM has used each Contracts type

Legend: CPFF – Cost plus Fixed Fee; CPIF – Cost plus Incentive fee; CP- Cost plus

Note: the total number of respondents for this analysis is 55

Source: developed for this research

Based on the result of the analysis in the table above, 42% of the project managers confirmed that they have experience in the use of reimbursable contracts. This is the most popular of all the contract types. The next popular contract type is lump sum

contracts which recorded 33%. This is followed by Unit rate (13%) and Day rate (5%) contracts. In this analysis, instances where a project manager has experienced both reimbursable and lump sum contracts were counted as one each for both contracts. Though reimbursable contract is most popular amongst project managers, lump sum contract is the most preferred type of contract used by project managers and corporations. The following was discovered when examining the statements relating to the advantages of reimbursable contracts and lump sum contracts.

The first main finding from the response is that reimbursable contract is cheaper and a cost effective contract option compared to lump sum contracts. This statement was supported by the following respondents. CS008 stated that, '*…the reimbursable is the cheaper of the two…the contractor will not load his bid with risk premiums and … Company X (Owner) will have a "ring fenced" project cost';* CS041, *'… Little or no risk to the bidding Contractors so pricing will be keener reflecting the lower risk … Contract planning and award cycles can be shortened…'; CS036, 'lump sum contracts are excessively expensive…these contracts are not transparent and not flexible to changes'.*

Another finding from the responses is that reimbursable contract produce better quality work compared to lump sum contracts. This statement was supported by the following respondents. CS036, '… *lump sum contracts are excessively expensive … and the quality of work may suffer as contractors will try to fit the work…';* CS006, *'…this type (reimbursable contracts) potentially leads to fewer disputes'; and CS007, 'Reimbursable contracts might have high quality… the contractor gets paid for every item he purchased/man-hour spent'.* He further criticized lump sum contract stating *'…On LS (lump sum) contractors…you cannot see where the money went to…cost savings possibly jeopardizing the project quality'.*

Closely related to the above is the finding that reimbursable contracts offer the owner a better opportunity to develop in-house resources in contracts strategy formation and management. This finding was supported by CS009 referring to *'…higher level of capability and experience development of the owner'.* Similarly, CS014 stated that

reimbursable contract will give the owner the opportunity to develop, *'… engineers that better manage a project…can develop alliance contractual arrangements that benefit both parties for long periods of time'*. This further reinforces the literature finding on the attributes of optimal contract which includes long term commitment and renegotiation. Refer to chapter 2, section 2.5.

It was also discovered that a reimbursable contract offers the owner a better opportunity to gain information about cost and contractor which can be used for future benchmarking, reliable estimates, and also ascertain the actual cost of the project. This finding was supported by CS006 and CS036. CS006 stated that '…m*ore detailed cost and other project information is available…the (cost) information gained from the project will help improve future projects as well'*. CS036 also added that *'…reimbursable contract give more insights on the work done and more control'*. This advantage provides a solution to asymmetric information from contractors which was discovered through literature review. It also provides a solution to resolving the issues of hidden information which is known only to the agent and not the principal as stated in the theory of contract. Hence confirming the literature finding on quality (valued or truthful) information as one of the attributes of optimal contracts.

Despite the numerous advantages of reimbursable contract above, most project managers and corporation still prefer lump sum contracts. One of the main reason 'why' they prefer lump sum contract over reimbursable is the ability to transfer risks to contractors. This statement was supported by CS014 stating '…Owners…favour fixed price contracting in order to transfer the risk…'; CS008: *'…the lump sum contract allows many of the cost risks associated with the Project to be "passed on" to the contractor'*. *CS036 confirmed that, 'lump sum contracts…transfer risks to contractors …'*. This practice of selecting a given contract type in order to transfer risks to the contractor without proper identification of the risks and allocation to the party best to manage the risks results in the formation of suboptimal contracts. This is mostly possible by the prescriptive nature of current contract framework which force PMs to use the corporate prescribe contract quilt. As stated in findings 2.3 above, company contract quilt prescribe the following for each of their business:

'upstream use reimbursable', 'LNG (Lump Sum)', 'Downstream large projects (lump Sum)', 'smaller less than USD$20 reimbursable', 'large projects use EPC (lump sum)' contacts. This example further confirms the literature finding of optimal risks sharing as one of the attributes of optimal contracts. It also reinforce the fact that corporate prescribe practices deprive the PMs the opportunity to identify contract drivers, rank the drivers and select the most relevant drivers to be used in the formation of optimal contracts.

Another reason 'why' lump sum is preferred by project managers and corporation is due to the fact that the owner does not have adequate number of experienced resources to supervise and handle issues relating to claims and contract management in a reimbursable contract. This finding is supported by CS014, *'…owners do not have adequate numbers of personnel or with proper experience to supervise reimbursable contracts';* and CS014 further stated that owners, *'… favor fixed price contracting…and reduce the size and capability of their management team'.* CS010 and CS009 further highlighted some of the major drawbacks of reimbursable contract as a reason for preferring lump sum contract. According to CS010: '*…if you have a reimbursable contract claim management will be necessary…'.* This was supported by CS009*: 'Reimbursable means the ability to manage and implement changes'.*

In examining the data and responses, it was also possible to deduce that the selection of a contract type over another is heavily dependent on the experience of the project manager. Most project managers are very well exposed in the use of lump sum contracts because this is very popular in their organization. Statements such as *'…most contracts are lump sum…' (CS018),* and the findings from foregoing analysis which shows that project managers are exposed to the risks of using suboptimal contracts by the lack of experienced contract personnel in their team is a pointer to the reasons why they prefer lump sum contracts with which they are very familiar.

Refer to appendix I for some illustrative quotes / extracts captured from email interview respondents.

4.3.3. Research Issue 3: What is the impact of identifying each risks element in the respective contracting types (lump sum and reimbursable) and properly allocating the risks regardless of the contracting type selected.

As discussed in findings 2.4 above, corporations selects a given contract in order to transfer the risks to contractors. This is known to have resulted in paying high premier for a piece of work which leads to high cost of projects. Therefore, this research question examines the impact of identifying each risk in a project and allocating the risks to person (contractor or owner) that is best placed to manage the risks. The identification of risk should be irrespective of the contract strategy. Based on the findings of the study carried out by the construction industry institute in 2006, it was seen that a proper identification of risks regardless of the type contract and a proper allocation of the risks will drive down the cost of a project. In order to examine this statement, the following questions were posed to the respondents.

The aim of the questions and sub questions used in soliciting responses from respondents were to determine how risks are identified and allocated between owners and contractors. The variables required were to establish how contract related risks are identified and how they are allocated to the parties that are best placed to manage the risks. One main theme and finding was discovered in this analysis. The theme points to the 'Why' derived through finding 3.1 (Why the basic principles of risks allocation/assignment are not complied with in the allocation of risks in a given Contract). The findings are examined below.

Finding 3.1: Non Compliance with principles of Risks allocation (key word finding)

The seventh finding of this research project is that **the basic principles of risks allocation/assignment are not complied with in the allocation of risks in a given Contract.** This finding was discovered by following a pattern of responses where most respondent expressed lack of knowledge of how their company identify risks

while establishing a contract and also some indications that the process needs to be improved. In examining the responses of 16 engineers to the question of how risks are identified and allocated in a project contract, the following outcome was captured and tabulated.

Table 4.8: Knowledge of Risks identification by Engineers

Note: the total number of respondents for this analysis is 16

Source: developed for this research

The response shows that 46% of the project managers expressed lack of knowledge while 54% had some knowledge but have never been involved in allocating/sharing the risks between the contractors and owners. All the Contract professionals that responded confirmed that they have some knowledge but most of them have also not been involved in the risks sharing between the contractors and owner. Other industry practitioners that responded did not have any knowledge of how risks are shared by corporations with their contractors.

The above findings further led to examining the responses in detail which led to the conclusion that the basic principles of risks allocation/assignment are not complied with in the allocation of risks in a given Contract for the reasons given below:

Some of the respondent gave a very clear response which demonstrated their understanding of the basic principles of risks identification and allocation. The responses from three respondent CS029, CS009, and CS012 were summarised and paraphrased to give further meaning to the principles of risks identification and allocation:

Risks have to be identified and costed (CS029), ...and the C&P strategy developed for the project has identified the best parties position (ability and willingness related to people, processes and tools) to take the different risks (CS009); and depending on the risk tolerance level of both parties and who best can handle the risk (CS012); ... assign an owner (CS029).

Based on the above, it can be seen that proper risks identification and allocation depends on ability and willingness related to people, process and tools. This research examines these three elements of people, process and tools in relations to risks identification and allocation in a contract.

The first element which affects proper risks identification and allocation relates to the ability and willingness of people. In the analysis of data, it was discovered that reference to people means Corporations and Personnel. Both corporation and their personnel were weak in the identification and management of Risks. This form of weakness was seen in the attitude of the corporations to risks identifications and allocation. Corporation has strong preference to select a contract strategy which allows them to transfer the project risks to the contractor or retain the risks without due considerations to their ability to manage the risks. This discovery is supported by statement such as *'...depends on...and whether ... is willing to buy off this risk'* (CS004). CS001 shared his experience stating that *'I saw too many contracts where the Owner shifted any risk they did not want to the Contractor, with no regard to either party's ability to handle the risk'*. The driver of the project also affects the willingness of the owner to 'buy off' the risks. CS030 supported this statement by saying that reimbursable contracts are selected *'where the client deliberately takes the risks to give lower overall cost'*. CS004 further confirmed this statement stating that the contract strategy *'...is shaped by how much of the risk ... wish to either carry ... or indeed pass on to the contractors'*. Corporations recognise that certain forms of contract are more expensive than the others but they prefer these contracts because they offer '*least risks'* (CS020). CS011 warned that lack of risks identification should not be taking as *'least'* risks because *'...all risks (even if they don't occur) will*

be priced and paid for by the client'. CS027 supported this warning stating that *'lump sum contractors tend to be conservative and price for all foreseeable risks...'*

CS030 stated that risks *'distribution ... which delivers the right (for all parties) ... will heavily constitute one of the major incentives to project successes'*. But further added that *'I realize that this is easier said than done since the commercial environment, drivers and company's strategies (dictating the appetite) might not always be in line with the above'*. The willingness to 'buy off' or accept a given risks depends not only on the owner but also the contractor's willingness. CS020 stated that Risks should be allocated to the party that can best manage them but added that '*...contractors will in the future no longer be prepared to accept for example risk of weather downtime or increasing steel prices'*. CS005 and CS012 concluded that the *'market forces'* and *'...the risks tolerance level of both parties...*' plays a major role in the decision by both parties to accept or transfer the risks.

The weakness in the people element was further supported by CS001. He stated that '*...Project risks management is not done thoroughly enough'*. Some respondents *(*CS001, CS023 and CS004) expressed lack of knowledge of how to assess contractor's risks owing capacity and also how to assign the risks. Some project managers seem not to be worried about lack of proper risks management. CS029 stated that *'as long as the risks allocation is part of the contract, then no problem'*. CS024 called for the upgrade (improvement) of Contract managers skills of *'...managing uncertainties/risks'*. Over 30% of the responses analysed in relations to risks stated that 'management' of risks was one of the main factors affecting successful risks identification and allocation. CS028 recalled from his experience that risks are not properly allocated in *'...about 60% of the cases!'* where he has been involved in the formation of contract strategy. CS001 further confirmed that *'some parties manage risk realistically, and some "hope" that the risk event doesn't occur'*. Lack of *'proactive measures'* (CS034) which will ensure proper follow up of identified and allocated risks is also an issue. CS025 stated that most of the risks identified at early stages of the project *'...were rarely followed up at execution phase'*. CS001 described the lack of proactive measures as resulting from *'...too much reliance on hope rather than reality'*.

The second element which affects proper risks identification and allocation relates to process and tools. It was discovered in the analysis of data that Corporate and personnel ability and willingness is also impacted by the availability of the right process and tools. CS003 describes the current risks management tool as *'...very basic and not well structured!'* Despite the lack of adequate risks capture and management tool, project managers are expected to comply with the *'Project Risk Management Process and Register should capture and assign Project risks'*. CS041 recognised the benefit of *'a good risks management system'* in the effective capture of the project risks, allocation of the risks and management of the risks.

In conclusion, it can be seen that several factors affect the identification and allocation of risks in contract strategy formation. These factors range from willingness of people to availability of robust process and tools. The most striking of all is the fact that project managers claim not to have experience of how risks are shared amongst contractors and owners in a given contract. Hence they express a preference to use a certain form of contract as a mitigation factor. This is a strong confirmation of the reason why most contracts are suboptimal. Hence, one of the main attributes of the optimal contract is optimal risk sharing being taken into consideration in the formation of contract. In order to make it very obvious and considering that the word optimal risks sharing does not properly highlight the importance of risks identification, this research will add 'identification' to the attribute of optimal risks sharing and hence the attribute will now be **optimal risks identification and sharing.** This extension of the attributes correctly captures the knowledge contributed by the PM to this study through the above data analysis.

Refer to appendix J for some illustrative quotes / extracts captured from email interview respondents.

4.3.4. Research Issue 4: What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

In the literature review, it was discovered that there serious lack of literature in this aspect of contract formation. Furthermore, people play major role in ensuring that optimal contracts are selected and also manage the contract. This research issue is aimed to examine the characteristics of the people that are involved in contract strategy formation. The aim is to establish the background and experience of the people making contracting decisions, investigate people competencies / experience issues and establish opportunity for improvement. The variables required were to examine any gap in the people aspect of contract formation and also contribute to bridging the gaps in literature in this regard.

Based on the analysis of responses, two themes were established. Both themes relates to the 'what' is required of the personnel making contracting decisions and also those that are supporting the project managers in the day-to-day administration of the contracts. The outcome of the analysis established a common understanding among project managers of the characteristics of the personnel involved in making contract strategy formation decisions and also their perceived gaps in experience and knowledge.

Finding 4.1: Local knowledge and contract formulation

The eighth finding of this research project is that **Personnel responsible for making contract strategy decisions should have sound local experience which includes good knowledge of the local market and local stakeholders.** This finding is supported by most respondents to the questions relating to people, competence, experience and skills. The responses were analyzed to determine the attributes or characteristics of the people involved in contract strategy decision making. The analysis did not aim at consensus amongst all the respondents but rather at discerning common beliefs, and at identifying any unique issues.

Table 4.9: Characteristics of people making contract strategy decisions

S/No	Attributes	CS001	CS012	CS002	CS032	CS041	CS030	CS009	CS024	CS017	CS010	CS005	Total	%
1	Expert level experience in contract management (Supply Chain Executives)	1	1	1	1	1	1		1		1	1	9	26%
2	Expert level experience in project engineering / management		1		1	1	1		1		1		6	19%
3	Specialist in Contract Law		1		1								2	6%
4	Team Leadership Skills		1										1	3%
5	Familiarity with Project location/environment	1	1		1		1	1		1		1	7	23%
6	Knowledge of Local Market		1		1					1		1	4	13%
7	Knowledge of local key Stakeholders			1	1								2	6%

Note: the total number of respondents for this analysis is 31

Source: developed for this research

Based on the analysis above, it was found that the combined total percentage support for attributes such as familiarity with project location/environment (23%), knowledge of Local Market (13%), and knowledge of local key stakeholders (6%) was 42%. This was the most supported combined attributes recorded. On individual attribute support level, familiarity with project location / environment had 23% supports. This was the second highest individual supported attribute besides expert level experience in contract management which received 26% support. This attribute is of a major importance in the contract strategy formation and management because the quality of decisions and efficiency depends on the availability of these levels of experience. Each of these two unique attributes (local knowledge and expert level experience) in contracting will be reviewed in detailed below.

Firstly, in relation to the importance of local knowledge, 64% of the respondents analysed above are expatriates (foreigners) working outside their home countries. Their response in supporting the requirements that a contract engineer should have practical local knowledge is no doubt based on their real life experience of establishing a contract strategy in environments or locations where they have no prior knowledge of the location, market and stakeholders. CS001 confirmed this in his response. He stated that Contract Managers are '*…generally not familiar enough with the particulars of the project'*. CS002 put it slightly differently. He acknowledged that supply chain executives are experienced but '… *may require*

advice and direction from Country Chair level on the key Stakeholder expectations'. CS005 further stressed that it will add significant value to the business to bring in contract engineers very early in the project phases but regretted that there are '… *not have many such contract engineers … with good market analysis and strategy development'*.

The need for Supply Chain Executives to have knowledge of local environment, market and stakeholders was further highlighted by CS032 in his response stating that '*…good knowledge of the market where the project is going to be located, knowledge of the stakeholders and their ability to leverage opinions and bias the local environment...*' should be considered as a mandatory requirement. This attribute is particularly very important due to the '*… cultural differences around contract binding obligations …'* (CS009).

Based on the above, *'… the lack of experienced personnel for location of project'* (CS032) and the '*…challenge of frontier location with no existing contractors with experience …' (*CS030) is a contributing factor to the '… *inefficient decision making…' (CS034).* This inefficiency translates into several delays in the contract strategy formation, and in some cases, inappropriate contracts are selected.

Second, expert level experience in contract management received 26% support. This was the highest scoring individual attribute. This attribute is key to ensuring quality contract strategy related decisions and contract management. The lack of expert level of experience in contracting is a major issue in the oil and gas industry. As discussed in finding 4.2 below, project managers feel exposed to the risks of suboptimal contracts by the lack of experienced contract professionals. Furthermore, literature reviewed in chapter 2 of this thesis also confirms this as a major issue (Berends, 2000; Mandil, 2005). The main reason attributed for the lack of experience contract professionals includes the fact that the existing experienced workforce is rapidly retiring. Corporations are experiencing a major scarcity of staff with the equivalent experience and skill to replace those going onto retirement without enough replacements. The impact of the scarcity of experience contract resources on the

contract strategy is affecting the capacity of the contractor and owner to support projects, and to put in place quality contracts and hence manage the contracts accordingly. This lack of experience explains why availability of experienced resources is seen as a major driver for the selection of one form of contract over the other. For example, reimbursable contract will not be selected if the owner has no in-house resources to manage the contract. This will be the final decision regardless of whether it is the most optimal contract to deliver the work. Details of evidence supporting this statement are discussed in finding 4.1 below.

In conclusion, the two most important attributes/characteristics required for a contract engineer as seen by project managers are knowledge of local environment and expert experience in contracting. Unfortunately, there is scarcity of these combined skills. Contrary to the literature finding in which it was stated that supply chain executives are 'not required to be familiar with the particulars of the project', this finding has proved that it should not be the case. The supply chain executive should have expert knowledge to ensure that optimal contract is established and managed. This is another major contribution of this research to the body of knowledge. In addition, as a result of the analysis of data, it is established that optimal contract should take into consideration environmental and local knowledge. Hence, the existing contract framework will be extended to include 'Environmental and Local Knowledge' as one of the main attributes of optimal contract.

Refer to appendix K for some illustrative quotes / extracts captured from email interview respondents.

Finding 4.2: Incomplete team capabilities

The ninth finding of this research project is that **Project Managers feels exposed to the Risks of suboptimal contracts by not having experienced Contract professionals in the Project team.** This finding was discovered based on the analysis of keywords across the entire responses. As a result of words frequency count in NVIVO, the following high occurring key words: experience/inexperience, lack of knowledge/awareness, not qualified, and competent/incompetent, were

selected for further analysis to examine any relationships between the words and contract strategy formation, selection and contract management. A pattern soon emerged in which the keywords were mostly used in the same sentence with reference to owner's team/personnel and contractor's team/personnel. Hence, a crossword to map each of the key words to the prevailing terms was carried out to further confirm the most predominant pattern and impact. The results are tabulated below and further confirm finding 4.1 above:

Table 4.10: Keyword analysis of owner and contractor capabilities

Keywords used in relations to:	Owner's team/Personnel	Total	Contractor's team/Personnel	Total
Inexperience	026, 036, 009, 030, 001, 010, 005, 037, 021, 025, 026, 025, 027, 010, 006, 018, 030, 014, 001, 018, 018, 014, 024	23	036, 023, 030, 036, 008, 020. 032, 030	8
Lack of Knowledge/Awareness	022, 018, 005, 006, 024, 017, 013	7	024	1
Not Qualified	010	1	010	1
Incompetent	041, 029, 024	3	041, 041, 017, 021, 025, 021, 29	7
TOTAL COUNT		**34**		**17**
% TOTAL		**67%**		**33%**

Source: developed for this research

Based on the analysis tabulated in the table above the following three conclusions can be drawn:

The first and most significant conclusion is that 34 (67%) out of 51 respondents used words such as inexperience, lack of knowledge, not qualified, and incompetent in the same context in describing owner's team or owners personnel. While 16 (33%) out of 51 respondents used words such as inexperience, lack of knowledge, not qualified, and incompetent in the same context in describing contractor or contractor team/personnel. As can be seen in the table above, 'inexperience' of the owner's team was dominant compared to the other attributes. 'Inexperience of the owner's team' recorded over 68% of the total count. This conclusion is further supported by some extracts from the respondents. CS005, in a response to the questions on reasons

for project delays stated '… *first and foremost have adequate availability of skilled and experienced contract engineers…'* CS029 had firsthand experience of where the Project did everything right but the main reasons for failure was lack of owner's team representative in the Contractor's office to resolve issues and look over progress. CS003 and CS041 both supported CS029. In reference to making sure that the process works, CS003 stated that '… *the process needs to be supported by experienced personnel from …, not by people that are new to the position'*. Statements such as '…*staff with qualifications to deal with this item are very rare'* (CS010)*; '… poorly thought out and implemented prequalification using inexperienced personnel, poorly written scope of work, instruction to tenderers…., inadequately thought out technical and commercial bid evaluation procedures'* (CS041) are clear evidence of the frustrations faced by project managers due to lack of experienced contract personnel in their teams.

Some respondent gave personal examples of their lack of contract experience. CS008 wrote '…*for people like myself who have worked for company X for many (33) years (but who have not directly been involved in contracts) it is likely that we lack the personal experiences'*. For Project managers like CS041, the main solution to the exposure is to *'… return to the practice where the professional Contacts Manager or Engineer assigned to the Project guides the Project Manager through the process and drives the technical folks to pursue and complete key pieces of work and activity to the required standard'*. This form of thinking and solution seems a major challenge. Perhaps the main challenge to put in place the solution suggested by CS041 is the high turnover and scarcity of experienced Contract engineers. CS013 and CS034 both support this as a challenge. CS013 gave *'part-time involvement of staff …, and high turnover of staff'* while CS034 *describes it as …' high rate of turnover of key … staff both within and outside the project'* as evidence.

Also very closely related to the above, is the fact that the lack of experienced personnel is affecting the quality of contract strategy related decisions that are made on the project. CS030 stated this as a reason for project failure. He stated '... *I believe it is lack of experience with the personnel making the decisions'.* CS014 added that

company *'... does not have adequate numbers of personnel or with proper experience'.* These statements are also supported by the findings that some experienced project managers claimed limited experience in some aspect of contract development or implementation. The following statements were captured from the responses by examining keywords which relates to 'experience/inexperience' and 'lack of knowledge' using extracts from project managers responses:

'I don't have much experience'; 'Not enough experience'; 'I have not that much experience'; 'No clue'; 'currently no experience'; 'I have no experience'; 'No experience with ...'; 'I am not aware especially as my experience is in ...; Nil (no experience in...)'.

It was discovered that 15 (50%) out of 31 Project Managers used one of the phrases above to describe their limited experiences in some aspects of Contract development or implementation. This further confirm the claim in literature that project managers are busy people (Camps, 1996) and *'ideal PMs'* with all the required project experience and skills in all related subject matters is not humanly possible (Davidson et al, 2009). It is therefore not feasible that PM should have expert level experience of contract strategy formation. However, as a minimum, a PM should be supported by an experienced contract professional in his team. This assertion is already confirmed in the data analysis in findings 4.1 which started that supply chain managers and contract personnel should have expert skill level in contracts.

Other conclusions but not supported by such strong evidence is that 'incompetent' was used more to describe the contractor's team/personnel compared to the owner's team. 'Incompetent contractor's team' recorded over 41% of the total counts. Although there are not many responses to support this conclusion, it is noteworthy that in a count of 10 where 'incompetent' was used in relation to owner or contractor teams, 7 of those describe the contractor's team. This discovery was supported by CS018 *'... small delay and small cost overrun, caused by an incompetent contractor'.*

CS002 '*... ensuring local contractors are fully competent.* The other evidence supporting this statement is from *CS025, '... lack of competent contractor personnel'.* CS021 described Lowest bidder contract as misleading as they may '… *not be … technically competent ...'* Based on my experience in one of my projects, recent managing director communication on the reason for the delay in the completion of a major project which is aimed to produce 175kbpd Oil was *'contractor incompetence'.*

A further analysis to confirm if there are any regional / location bias in the above analysis reveals that the spread is fairly representative of the whole set of participants. Asia and Europe recorded 18 and 19 respectively, while Americas and Africa/Middle East recorded 5 and 9 respectively. Hence it is safe to conclude that it is a global (industry) wide belief that the owners team is largely inexperienced in contract strategy formation through to post contract award management. This is not surprising considering the progressive retirements of experienced contract personnel from the industry. However, most of those retiring from the owners organisations as fulltime resources do turn up in contractor organisations as part-time contract resources. There are no evidence in the data analysed to support this claim. But from my experience, it appears that the owners' organisations do not provide the flexibility for retiring personnel to continue as a contractor post retirement. Hence, they leave to continue working in projects with EPCs.

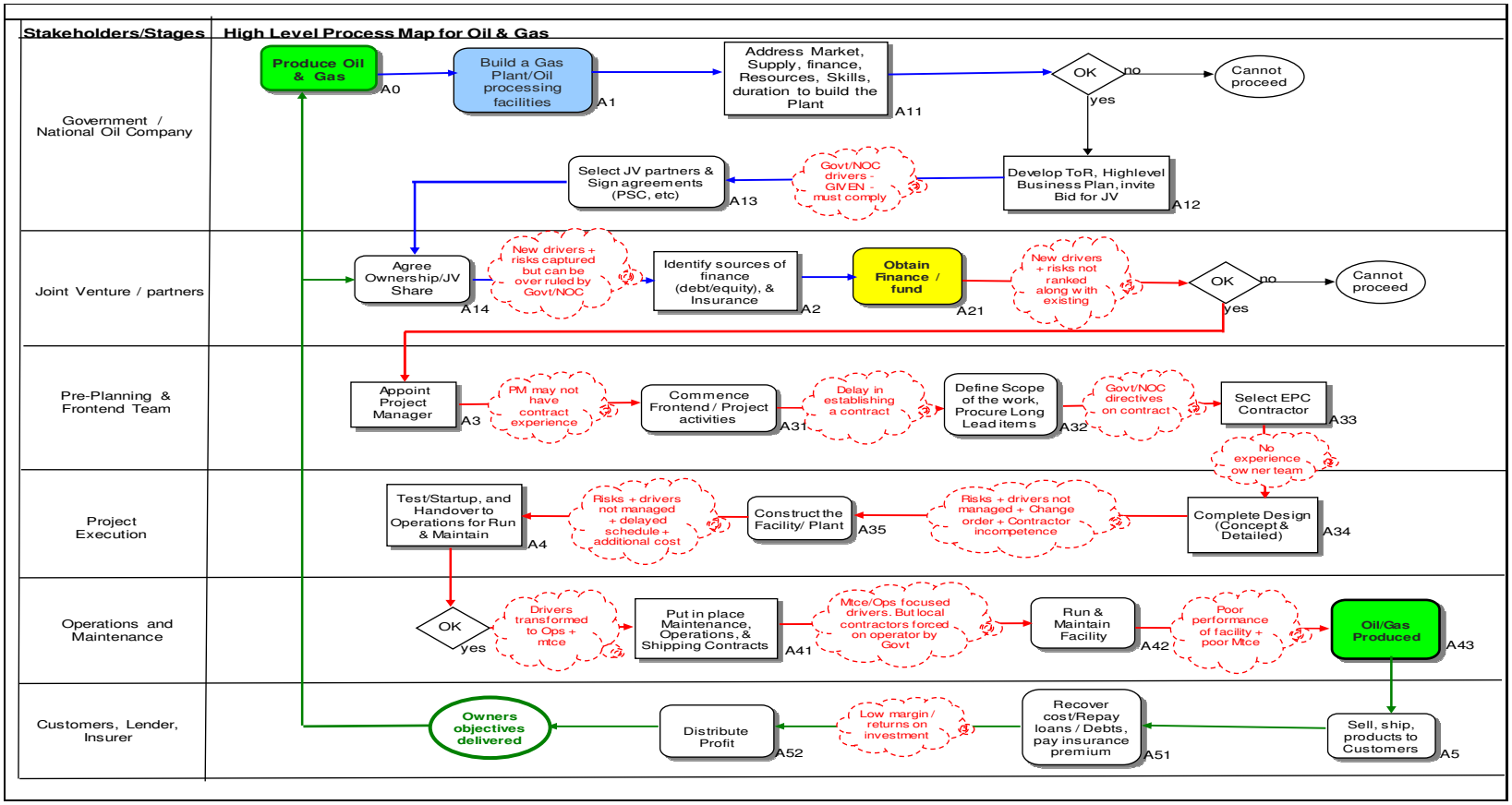
Based on the foregoing analysis, it can be concluded that Project Managers do not have complete overview experience of all forms of contracts. Hence they are heavily reliant on Contract specialists on the project. Furthermore, based on the findings discussed in 4.1 above and in this section, it is surprising that skills availability has been overlooked by literature as critical to the successful formation of optimal contracts. Hence the attributes of optimal contract may be extended to include 'owner and contractor skilled personnel availability' required to successfully establish and manage optimal contracts.

Refer to appendix K for some illustrative quotes / extracts captured from email interview respondents.

4.4 SUMMARY OF FINDINGS

One of the objectives of this research is to contribute ideas to develop a descriptive theory of contract formulation in the oil and gas industry which can be considered as optimal for operations and capital expenditure projects in oil and gas industry. The current prescribed framework used by PMs is rigid and does not meet the attributes of optimal contracts. Based on the data analysis crossed checked against the information gathered from Literature review and contract theory, the following oil and gas process diagram was developed. The contract related issues and gaps captured from data are also highlighted in the process map. The oil and gas process map is presented in the diagram below.

Figure 4.2: Oil and Gas High-level process map



Source: developed for this research

The process map shows the major process steps in the production of oil and gas from initial planning phases until the first oil and gas is produced. The information captured in red fonts represent the gaps/issues in the process of establishing a contract and managing the contract. The gaps/issues were captured based on the outcome of the review of literature and theory of contracts, and data analysis. The process map contains the 'as is' current practices and gaps in the formation of contract strategy. This research will further use the findings captured in the data analysis in this chapter to revise the theoretical framework which was developed from the review of literature to map out the contributions of this research and the improvements required to achieve optimal contract strategy.

4.5 REVISED THEORETICAL FRAMEWORK

Based on the outcome of the data analysis, the previous theoretical framework developed from the review of literature and contract theory was revised to allow capture of the new findings. The revised version of the framework is shown in Figure 4.3. The summary of the main additions to the framework are as follows:

A) A simplified but focused definition of Contracts in oil and gas industry. The definition is based on the preference of project managers which includes having more insights on the work being executed, more controls, and more flexibility. It also takes into consideration the need for a contract to be tailored to the environment in which the project is executed.

B) Another addition is to the prescriptive contract formation methods. The two additions to this bubble are made to address the ambiguities and delays in the formation of contracts. They also address the need plan for "turning points" which could occur during the execution of the contracts. Projects may be long haul spanning a considerable length of time (Berends & Dhillon, 2004). Therefore, proper scenario analysis is needed to establish a robust plan which will be used to manage "turning points" (Wack, 1985b) the course of execution of the work is required.

C) The next addition is to the variables used in the formation of contracts. Based on literature and data analysis, all the variables required to form a contract should be identified, ranked and prioritized in the order of importance to enable the selection of the most relevant variables. As seen from the data analysis, the

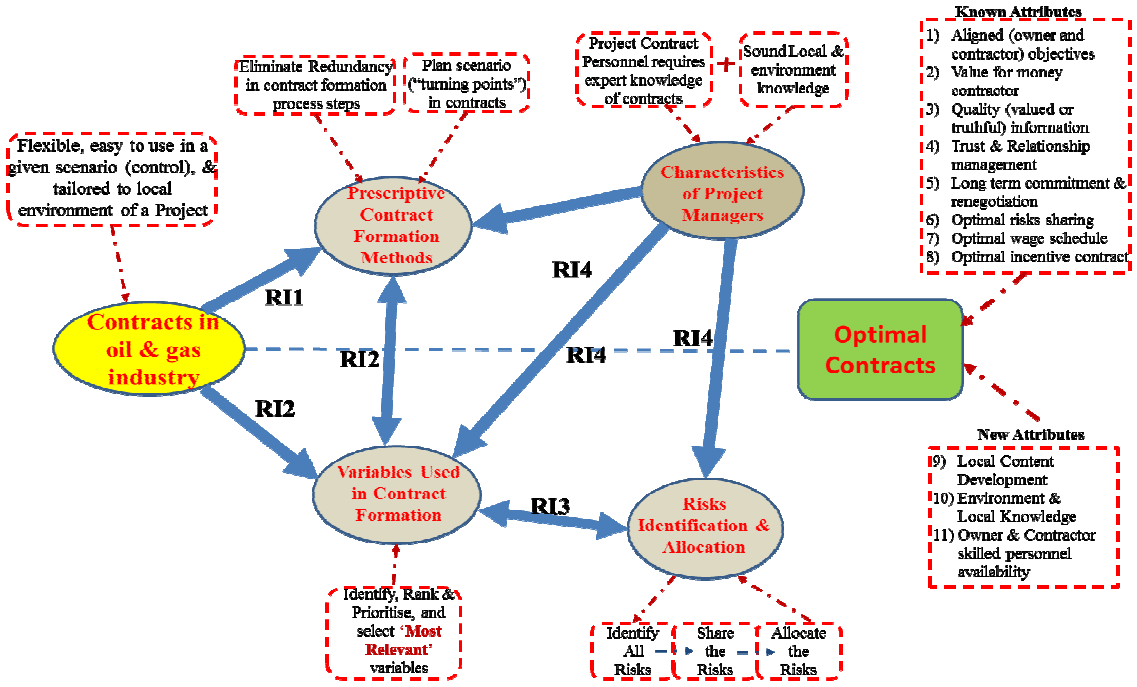
prescriptive nature of the current framework prevents the identification and selection of variables which will enable 'tailoring' of the contracts to the local environment of the project operates.

D) The steps to achieve optimal risks sharing are also added. To achieve optimal risks sharing, all risks must be identified, shared based on the ability of each party to manage the risks, and allocated to the party that is best placed to manage the risks. This is in accordance with the basic principles of risks identification and allocation. Furthermore, a risk management strategy is required to handle the process, people, and tools related issues including compliance with the basic principles of risks identification and allocation.

E) The next addition is to the characteristics of the project managers. The changes emphasize the need for contract personnel assigned to projects to have expert knowledge of contracts in addition to knowledge of the local environment.

F) Finally, the eight attributes of optimal contracts discerned from the review of literature were further extended to include the three newly discovered attributes from the analysis of data. All eleven (11) attributes were added to the framework to make it more comprehensive. Furthermore, the recommendation of this thesis will require PMs to validate contracts against the eleven attributes to demonstrate that the contract form is optimal.

Figure 4.3: Revised Theoretical Framework



Source: developed for this research

Note: Additional elements to the previous theoretical framework in chapter 2 are indicated by red broken lines.

4.6 CHAPTER CONCLUSION

This chapter presented the findings of the analysis of the data collected including a framework of the current contract strategy formation process. It also identified the main drivers and the different voices in the contract formation and selection process. Based on the data analysis, it was concluded that the current outsourcing and contracting methods does not use the product of consideration of issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction in Capital Projects through proper allocation of risks in the formation of contract strategy and in the selection of appropriate contracts.

Furthermore, it was also noted that given the prescriptive framework of contracts formulation, various situational contingencies make the implementation of this prescribed theory not feasible. Hence contracts are suboptimal. These situational contingencies have been identified in the analysis of data. Therefore, this research project has contributed ideas of what needs to be done to develop a descriptive theory of contract formulation in the oil and gas industry that has some chance of addressing delays, cost overruns etc. Hence, by contrast, there comes the possibility of optimal contracts.

The next chapter will be dedicated to discussing and identifying final conclusions, implications and limitations of the findings discussed in this chapter.

Chapter 5: Conclusion

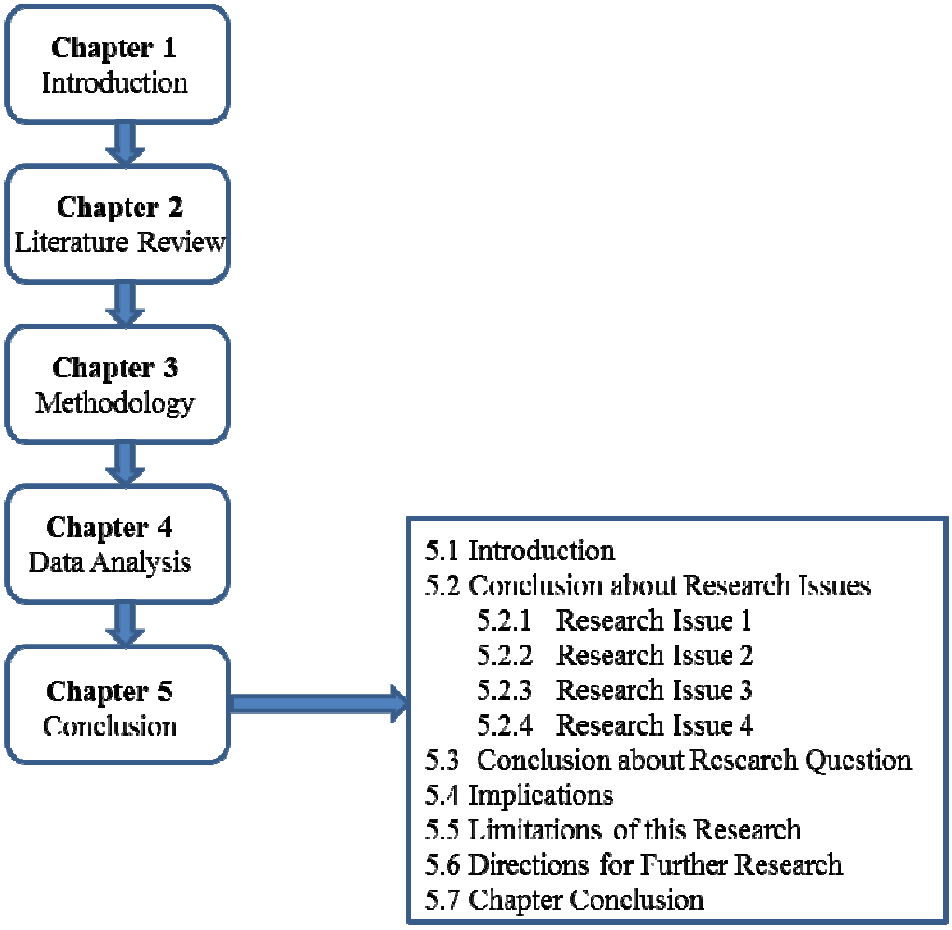
5.1 INTRODUCTION

In the previous chapter, the analysis of the data collected to study the four research issues was carried out. The result of the data analysis led to modifying the initial framework used for this research.

The main research question explored in this thesis is outlined in chapter 1: **How can structured contract strategies be established for oil and gas industry?** The research question was further refined in chapter 2 through the review of literature and the theory of contracts. This resulted in the development of a framework with four research issues to address the research question. In chapter 4, themes were established through the analysis of data. These themes became important findings to address the research issues. This data analysis led to the revision of the initial framework which was developed in chapter 2.

In this chapter, the conclusion of each of the four research issues will be considered by contrasting the findings from the data analysis and the review of literature. This contrast will help ascertain the specific contributions of this study to the research question. The outline of this chapter is as summarized in Figure 5.1 below.

Figure 5.1 Outline of chapter 5



Source: developed for this research

5.2 CONCLUSION ABOUT THE RESEARCH ISSUES

This chapter presents the conclusions drawn from the findings of the data analysis compared with the literature reviewed. The conclusions of each of the Nine (9) findings are contrasted against the literature to confirm their level of contributions. Three classes *(High, Medium, and Low level)* are used for the grouping of the contributions as follows:

- ✓ *High* contribution indicates where the contribution is new in this area of research.

- ✓ *Medium* contribution indicates where the contribution is a confirmation of the literature but the findings and recommendations have not been empirically tested on Project Managers.
- ✓ *Low* contribution confirms known ideas about PMs and Contract Strategy formation.

The conclusions are presented in a table below.

Table 5.1: Summary of conclusions and level of contributions

Research Issue	Conclusions	Contribution
Research Issue 1: What are the methods used by corporations to arrive at the formation of contracting strategy?	**Conclusion 1**: Contract strategy formulation process is too lengthy and prescriptive hence the delay in establishing contracts for Projects. **Conclusion 2:** The selection of a value for money contractor is the most practical option to reduce the cost of projects through Contracts.	**Medium** **Medium**
Research Issue 2: How are the major drivers for Contract strategy formation identified, evaluated and ranked in importance and impact?	**Conclusion 3:** For the successful execution of a given contract strategy the alignment of Drivers between Contractor and Owner is crucial to ensure a common goal to deliver the project objectives.	**Low**

	Conclusion 4: The risk of selecting a suboptimal contract strategy is very high due to National Oil Company or Joint Venture directives and interferences.	**High**
	Conclusion 5: Corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non inclusion of some drivers in the contract strategy formation for projects.	**High**
	Conclusion 6: Reimbursable contracts produce better quality work at lower cost than Lump Sum contracts but companies prefers Lump Sum Contracts	**High**
Research Issue 3: What is the impact of identifying each risks element in the respective contract types (Lump sum and reimbursable) and properly allocating the risks regardless of the contract type selected?	**Conclusion 7:** The basic principles of risks allocation/assignment are not complied with in the allocation of Risks in a given Contract.	**Medium**
Research Issue 4:	**Conclusion 8:** Personnel responsible for making Contract strategy	**High**

What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?	decisions should have sound local experience which includes good knowledge of the local market and local stakeholders. **Conclusion 9:** Project Managers are exposed to the risks of suboptimal contracts by not having experienced Contract professionals in the Project team.	**Medium**

Source: developed for this research

5.2.1 Conclusion Research Issue 1: Contract Strategy Formation Methods

Research Issue 1: What are the methods used by corporations to arrive at the formation of contracting strategy?

Two main conclusions were drawn from this research issue as follows:

Conclusion 1: Contract strategy formulation process is too lengthy and prescriptive; hence the delay in establishing contracts for Projects.

In the literature review, it was established that organisations have contract formulation processes, which they consider optimal designed to guide PMs. In the literature review, eight attributes of optimal contracts were identified. Namely; aligned (owner and contractor) objectives, value for money contractor, quality (valued or truthful) information, trust and relationship management, long-term commitment and renegotiation, optimal risks sharing, optimal wage schedule, and optimal incentive contract. Refer to chapter 2, section 2.5.

In the finding in chapter 4, existing process of formulating contract was criticised by PMs as very prescriptive and rigid. In the literature review finding, it was established that little is known about how PMs utilise the existing process. PMs describes their understanding of the process as 'clear as mud'. There is evidence in both the literature review and data analysis which confirms that contracts are suboptimal due to the various challenges of establishing a complete contract (Salanie, 2005; Tirole, 1999; Segal, 1999; Maskin & Tirole, 1992). Though the literature review identified eight attributes of optimal contract there are no evidence in the data analysis that the eight attributes are considered in the formation of contract. As seen in both literature review and data analysis, alignment of stakeholders' objective is hardly carried out. There are varied interests and hidden information by all parties which leads to lack of trust which affects relationships and also the selection of value for money contractor. Furthermore, corporate policies and NOCs play a major role in deciding the type of contracts to select. This reliance on corporate directives further impacts on any long-term commitment and optimal risks sharing. Efforts by companies to incentivise the contracts through optimal wage and optimal incentive is also affected.

Furthermore, some steps in the formation of contract strategy are confirmed in the data analysis as not adding value but simply an exercise to fulfil corporate policy or done as a tick in the box. According to project managers some of these steps in the process of formation of contract strategy are not necessary but required to be complied with by the corporations. Hence delays in establishing a contract. There are also evidence in the data analysis which confirms that pre-qualification of contractors are complex, time-wasting and resulting in schedule delay, lacking the quality and information required to properly conduct the exercise, and lacking the experienced personnel to carry out the exercise. Despite all of these, it is also confirmed that in some location prequalification of contractors is not supported by the policies of some NOC. Thus, the prequalification process does not add any value in these circumstances.

Based on the result of the data analysis, it was discovered that the current 'prescriptive framework' used in the formation of contract does not meet the PMs preferred contract. PMs prefer a contract that is flexible, easy to use in a given scenario (control), and tailored to local environment of a project. Hence the need for a 'descriptive theory' of contract formation in the oil and gas industry that better reflects the operating environment in which the project manager operates. It was also confirmed that PM requires support to establish and manage a contract, eliminate waste and redundancy in the process, plan 'turning points' (scenarios) in the contracts, and ensure that the contract reflects the environment of the project.

The above findings largely provide an empirical confirmation of the review of literature. This research has empirically tested the findings on Project Managers as seen from the result of the data analysis. Hence the level of this contribution to knowledge is classified as 'medium'.

Conclusion 2: The selection of a value for money contractor is the most practical option to reduce the cost of projects through Contracts.

In the literature review it was established that corporations' prescriptive policies restrict PMs to selecting lowest bid contractors. In the literature review, it was established that contractors are selected through competitive tender. The selected contractor has to be the lowest bidder. This practice is confirmed in the data analysis. It was also confirmed in the data analysis that the lowest bidder clauses in the prescriptive framework used by corporation have been extended to include clauses such as the most technically qualified lowest bidder contractor. Though the extension of the lowest bidder clause has positive impact on the outcome of contractor selection, it also results in extra steps to evaluate the bids in order to ensure that the contractor is technically qualified to do the job before commercial evaluation of the bid to ensure that the bidder is the lowest. Again, these extra steps are additional work requiring resources and time to complete which can lead to delays in setting up a contract.

While the data analysis established the characteristics of a lowest bidder contractor to include – 'Low staff morale', 'low efficiency and productivity', desperate to secure the job', do not understand scope, changes/variations', 'expensive/costly', and 'incompetent'; value for money contractor was described as a contractor who ensures that the money you pay is commensurate to the technical merits and quality of work being delivered. Value for money contractors are also confirmed in the data analysis as "cheaper" on the long run when the total cost of ownership is taking into considerations.

In the data analysis, the literature review finding that lack of 'valued or truthful' information to properly identify and evaluate the contractor in order to select value for money contractor was confirmed. In addition, it was also established in literature review that some contractors make false representation of information in order to win the job. The data analysis also confirms the theory of auction (Salanie, 2005) which states that 'bidders generally submit a bid which is lower than their valuation of the goods but the bid is slightly higher than their competitor'. This practice leads to contract variations during the execution of the project.

Finally, though this contribution is new to this research i.e. there are no literature findings where the characteristics of the lowest bidder was so detailed, but some of these attributes can be deduced from the literature and theory of contracts. However, this is clearly the first time that this finding has been tested empirically on PMs. Hence the level of this contribution to knowledge is rated *medium.*

5.2.2 Conclusion Research Issue 2: Selection of Contract Strategy Drivers

Research Issue 2: How are the major drivers for contract strategy formation identified, evaluated and ranked in importance and impact?

Four main conclusions were drawn from this research issue as follows:

Conclusion 3: For the successful execution of a given contract strategy the alignment of drivers between contractor and owner is crucial to ensure a common goal to deliver the project objectives.

In the literature review, it was established that moral hazards exist where the objectives of the parties differs. This was further confirmed in the data analysis. Using the analysis of data, it was established that key players - project managers, partners/government, and corporation have different voices in the formation of contract strategies. The objectives of all the players are usually not taking into considerations in the formation of a contract. This leads to using suboptimal contracts. Hence, there is mistrust and failed contracts.

In the literature review, the need to manage relationships through the alignment of objectives was also established. Salanie (2005) described the interdependence of both parties once a contract is signed. The success of the principal depends on the contractor's succeeding in delivering the work. Hence, there is a need for trust and relationship in executing the contract. The data analysis also confirmed this stating that the alignment of objectives will certainly increase trust and strategic fit which will be the underlying forces of the success of the contract strategy.

The need for trust and relationship is established in literature review, and confirmed in the analysis of data, as one of the attributes of optimal contracts. The data analysis also confirmed trust and relationship as an attribute which supports alliancing and partnering with key contractors.

Another finding from the data analysis is related to the attitude of engineers towards contract strategy. It was established that contract is likely to be perceived by engineers as a means rather than a vehicle, with an attitude that ambiguity can be opportunistic, and done in isolation from other business functions/teams. Though the attitude that ambiguity can be opportunistic confirms the literature findings that '*the*

size of a contract is proportional to the ambiguity in the contract', there was no evidence in the literature to confirm that this has an influence on the engineers' attitude towards contract strategy formation.

In conclusion, this research found that alignment of the drivers between contractor and owner is crucial to ensure a common goal to successfully deliver the project objectives. This contribution is rated *low* because it is mostly a confirmation of the findings established in the literature.

Conclusion 4: The risks of selecting a suboptimal contract strategy are very high due to National Oil Company or Joint Venture directives and interferences.

In the review of literature it was established that there are different stakeholders in the oil and gas industry with varied interests and different voices in the formation of contract strategy. The major stakeholders were identified as Government/NOCs, JVs, Lenders/Financial institutions, and IOCs. The varied objectives of these stakeholders which are also described as drivers are critical in the definition of the objectives of the business and projects. Hence these objectives are required to be aligned. Refer to conclusion 3 above for the outcome of the aligned objectives.

In the data analysis, it was found that the alignment of objectives is threatened by the fact that some stakeholders have a stronger voice and therefore dictate the drivers to be used in the selection of the contractors. In particular, the data analysis revealed that non-compliance with NOC and JV instructions/directives or interference has very strong consequences which can lead to the withdrawal of licence to operate, stoppage of funding, strained relationships and high cost of projects. The need to comply with NOC and JV directives therefore prevents PMs from selecting some relevant variables in the formation of contracts. As a result, suboptimal contracts are used in the execution of projects.

The data analysis also established that NOCs in Africa, Middle East and Asia regions are mostly likely to give directives to IOCs to select a given contractor. It was further

established that the reasons for imposing a given contractor on PMs is sometimes to achieve NOC local content policy. Furthermore, it was also established through data analysis that local content development which is one of the major drivers of NOC and JV is a strong factor in the selection of optimal contracts. The lack of considerations and attention to this factor results in using suboptimal contracts in the delivery of projects.

This finding is significant hence the conclusion that local content should be added as one of the attributes of optimal contracts. Though local content development in oil and gas industry is extensively discussed in most literatures, this is the first time that it has been considered as a unique characteristic of optimal contracts. Hence, the level of contributions to knowledge of this finding is rated *high.*

Conclusion 5: Corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non-inclusion of some drivers in the contract strategy formation for projects.

In the literature review, it was established that a contract is never complete because 'only' the 'most relevant' variables (Salanie, 2005) tend to be used in contract strategy formation. Hence there is a need to select drivers from all relevant variables in order to achieve optimal contracts. The concept that a 'contract is never complete' was confirmed in the data analysis. The literature finding that only relevant variables are selected to reduce cost of preparing a contract is also confirmed in the data analysis. Hence, it was also confirmed in the data that the size of a contract is proportional to the ambiguity in the contract. PMs see 'ambiguity as opportunistic'.

There is still a gap in the knowledge of how the drivers are identified, ranked and selected. The earlier hypothesis that it is not known the contingencies taking into considerations by PM which influences the selection of any given variable is correct. The subject of identification, ranking and selection of variables is a novelty to PMs. PMs relies heavily on the prescriptive framework dictated by corporate policies.

Hence the use of only variables prescribed by the corporations. Therefore, the knowledge gap of how variables are identified and selected for the formation of contracts still exists.

Hence, the conclusion is reached that corporate policy prescribes drivers for the formation of contracts. This research further confirms that the subject of identification, ranking and selection of variables is a novelty to PMs. Therefore,, the level of contribution is rated *high*.

Conclusion 6: Reimbursable contracts produce better quality work at lower cost than Lump Sum contracts but companies prefers Lump Sum Contracts.

The literature findings that reimbursable and lump sum contracts are the most popular types of contracts used by corporation was confirmed in the data analysis. It was also established that the decision of which type of contract to select (reimbursable or lump sum) is dictated by corporate policy as stipulated in the contract quilts, in which the scope and inter-relationship of contracts are depicted. Some functions/business are restricted to the use of certain form of contracts only. Furthermore, it was also established that reimbursable contract is the most popular contracts used by PMs. Controls, flexibility, transparency, and lower cost are confirmed as the reasons why PMs prefers reimbursable contracts.

On the other hand, it was established that despite the popularity of reimbursable contracts, corporations prefers lump sum contracts. The fixed nature of the cost and also the peace of mind resulting from the transfer of project risks to contractors make this contract type very appealing to corporations. The data analysis also confirms the literature findings that the size of owner's team plays a great role in the decision of which contract type to select. Where owner's team is large, then the reimbursable contract is used. Otherwise, the lump sum contract is preferred.

Another new finding is that PMs have more experience in the use of lump sum contracts. It was further discovered that corporation's preference for lump sum contract is an influencing factor in this regard. After all, PMs are mostly forced to use lump sum contracts hence they get very familiar with its implementation. Hence, they are more likely to select lump sum over reimbursable contracts.

Furthermore, it was also confirmed in the data analysis that reimbursable contracts produce better quality work. In reimbursable contracts, contractors are known to comply with process and standards in the delivering of the work. Owner's staff are involved in the supervision, assurances, and due diligence of the work. In lump sum contracts, contractors may cut corners to reduce cost of delivering the project hence maximises profit.

Thus, it can be concluded that reimbursable contracts produce better quality work at lower cost than Lump Sum contracts but companies prefers lump sum Contracts. The above finding is mostly new. Therefore, the contribution of this finding is rated *high.*

5.2.3 Conclusion Research Issue 3: Risks Identification and Allocation

Research Issue 3: What is the impact of identifying each risks element in the respective contract types (Lump sum & reimbursable) and properly allocating the risks regardless of the contract type selected?

One main conclusion was drawn from this research issue as follows:

Conclusion 7: The basic principles of risks allocation/assignment are not complied with in the allocation of Risks in a given Contract.

In the literature review it was established that lump sum contracts are mostly selected by corporations in order to transfer risks to the contractor. The data analysis

confirmed that these approaches to selecting contracts are suboptimal. The relative significance of different sources of risks is not determined. The data analysis also confirm this practice in which PMs, and indeed organisations, have a preference for certain type of contracts. These contracts are selected irrespective of the risks involved, and they pay high premium for the peace of mind that these risks are transferred to the contractor. This observation also in accordance with and it confirms the literature review finding of organisational negative attitude towards risks identification and management (section 2.3).

In addition to organisations' attitudes to risk identification, the data analysis also confirmed that PMs often have no experience of risks allocation to the parties that can best manage them. PMs recalled that risks were not properly allocated in about 60% of projects. This wrong allocation of risks is happening because organisations lack proactive measures which will ensure proper allocation and follow-up on identified risks. Hence PMs can only *hope for* rather than ensure the *reality* that the risk events to not eventuate.

Another finding from the literature review is that the current process of identifying risks is complex. This complexity, in addition to the lack of guidance is the reason why PMs do not put in considerable effort in risk identification and management. The complexity of the current process and the fact that project risks management is not thorough is confirmed in the data analysis. The tools used for the capture and management of risks are described as *very basic and unstructured.* Hence the lack of good risk management tool impacts the project risks identification, allocation of the risks and management of the risks in the project.

Finally, the process steps to achieve risks allocation was confirmed in the data analysis. This process includes the identification of the risks, sharing of the risks, and allocation of the risks to the party best placed to provide the risk management. These steps are required in compliance with risks identification and allocation principles. Hence fulfill the optimal risks sharing attribute of optimal contract. However, it is noted that throughout the data analysis, most of the responses indicate the lack of an

effective Risk Management Strategy. A Risk Management Strategy will address issues such as those relating to process, people and tools which are summarized in this conclusion.

The level of contribution of this finding is classified as *medium*. The reason for this is because the subject of risk identification in projects is not new. Most of the findings are covered in the literature review. However, it is suggested that this is the first time that these findings have been empirically researched on PMs in contract strategy formation.

5.2.4 Conclusion Research Issue 4: Characteristics of persons making contract strategy decisions

Research Issue 4: What are the characteristics of persons, their positions, their assumed experience and general background that are involved in the contract strategy formation process?

Two main conclusions were drawn from this research issue as follows:

Conclusion 8: Personnel responsible for making contract strategy decisions should have sound local experience which includes good knowledge of the local market and local stakeholders.

In the literature review, it was established that very little information is available on the subject of characteristics of the people that are making contract strategy decisions. It was also established in the literature review, that people making contract strategy decisions lack the required local environment experience. The lack of experience was further established as one of the contributing factors to the selection of suboptimal contracts. This finding was confirmed in the data analysis on PMs'

responses. Expat PMs confirmed that based on their experience, local knowledge of the market and environment contribute to selecting optimal contracts for a project.

In the data analysis the most important characteristics of people that are making contract strategy decision are confirmed as - familiarity with project location/environment, and knowledge of local market and local key stakeholders. Furthermore, PMs were also very critical of the fact that they had no local knowledge hence reliant on their corporation 'country chair' for local input.

This contribution is new to the body of knowledge. Apart from the fact that this finding has also been empirically tested on PMs by this research, the literature review did not explicitly state this finding. Therefore, the level of contribution of this finding is classified as *high.* This contribution also resulted in the extension of the existing framework used for this study to include local content development, and environment & local knowledge as an attribute of optimal contract.

Thus, the conclusion is formed that personnel responsible for making contract strategy decisions should have sound local experience which includes good knowledge of the local market and local stakeholders.

Conclusion 9: Project Managers are exposed to the risks of suboptimal contracts by not having experienced contract professionals in the Project team.

In the literature review, it was discovered that there is *hardly any analysis or facilitation* in the contract strategy formation workshops. Incompetence of contractors and inexperience of the owner's team is confirmed in the data analysis to be responsible for the poor quality of input document (lack of analysis) in the workshops. The same reasons were confirmed as responsible for the lack of *facilitation* in these workshops.

The literature finding that the oil and gas industry is suffering from progressive retirement of experienced personnel due to the ageing workforce was also confirmed in the data analysis. PMs used words such as 'scarcity of experienced personnel' and 'high rate of turnover of staff both within and outside the project' to describe the shortages of experienced personnel.

The next finding from data analysis clarifies the finding in the literature about the skill of the supply chain manager. Whereas it was established in the literature review that supply chain managers are not required to have expert knowledge of contracts; the data analysis confirmed 'expert level experience of contracts' as one of the characteristics of the people making contract decisions.

Using words captured in the data analysis, it can be concluded that the lack of experienced personnel for location of projects and the challenge of frontier location with no existing contractors with experience is a contributing factor to the inefficient decision making which results in several delays in contract strategy formation and also in the selection of suboptimal contracts.

The conclusion reached is that PMs are exposed to the risks of suboptimal contracts by not having experienced contract professionals in the Project team. This finding is also classified as *medium* because it is not new but this is the first time that the findings have been empirically derived from research on PMs. Furthermore, the existing framework used for this study was extended by the inclusion of owner and contractor skilled personnel availability as an attribute of optimal contract.

5.3 CONCLUSION ABOUT THE RESEARCH QUESTION

The final theoretical framework for this research is presented in this section. It incorporates the conclusions including interrelationships noted in the above sections in the final framework. This section also synthesises the research contributions into

solutions to the research question/problem about how structured contracts strategies can be established for oil and gas industry.

The theoretical framework brings together what has been established in the current literature and theory, and extends what has been found in the real world of oil and gas to describe how structured contract strategies can be established. The framework commences with two main themes - contract process and contract type in oil and gas industry. These two themes are central to understanding the current practices of contract strategy formation in oil and gas industry. PMs described their preferred contract as one which is flexible, easy to use in any given scenario, and tailored to local environment. In order to achieve the desired flexibility, the current prescriptive and rigid framework for formation of contract strategy should be improved through the elimination of redundant process steps. In addition, *turning points* should be planned into contracts using scenario analysis/planning. This form of flexibility will give PMs the opportunity to react to changing conditions/risks throughout the life of the project.

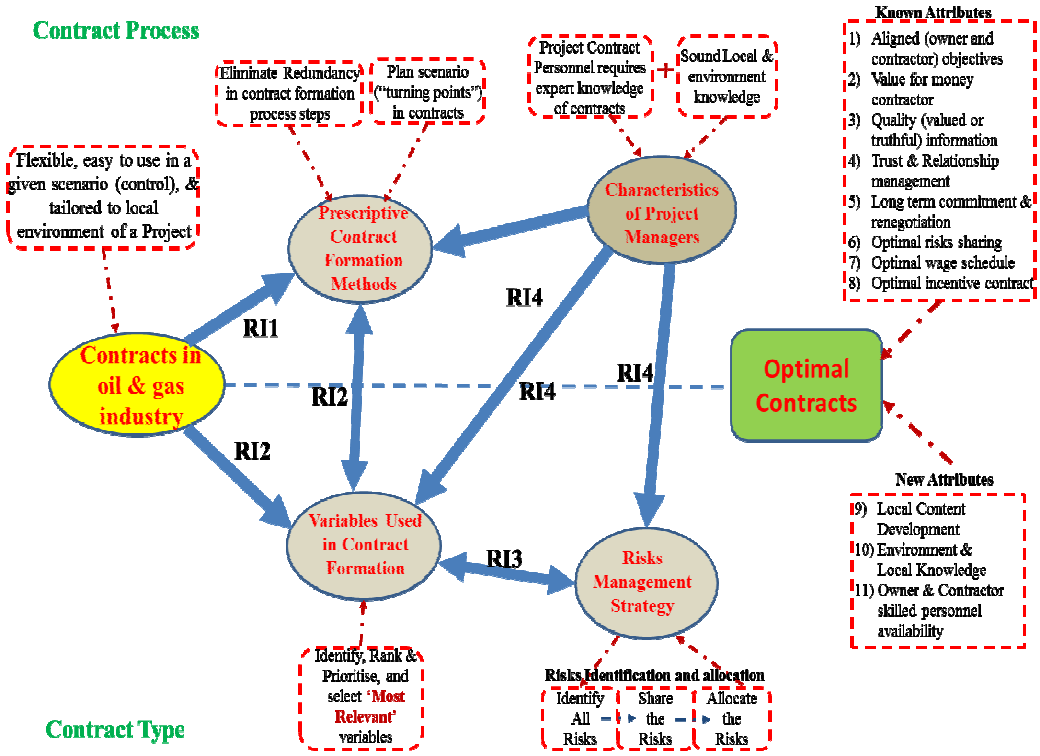
The contingency which influences PMs to select certain variables in the formation of contract is unknown. PMs have very little guidance in the formation of contract strategy and in the selection of variables. The guidance required should be in identifying all the variables, ranking and prioritization of the variables, and selection of the *most relevant* variables. Another major variable in the selection of contract strategy is *risks*. A risks management strategy which addresses issues relating to process, people and tools is required to drive the right attitude towards the proactive identification, sharing and allocation of risks in accordance with the principles of risks allocation.

The main decision of which optimal contract to use for a given project is left to the PM and his team. The teams are mostly inexperienced in the formation of contracts. PMs require guidance from their contract team. These contract personnel should have expert knowledge and experience of contracts as well as sound local and project environment knowledge.

Finally, an optimal contract is defined as a contract which uses the product of consideration of issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction through proper allocation of risks. Therefore, for a contract to be defined as optimal, it should meet the eleven (11) attributes/characteristics defined in the final theoretical framework. Hence cost reduction can be achieved through the use of optimal contracts in capital projects. These attributes forms the descriptive framework for contract strategy formation.

The final framework for this project is depicted below.

Figure 5.2: Final Theoretical Framework



Source: developed for this research

Note: Risks Management Strategy is added to the revised theoretical framework in Figure 4.3 (chapter 4).

5.4 IMPLICATIONS

The implications discussed below are based on the above conclusions.

5.4.1 Implications for Theory

This section presents the implications of arising from this research for theories relating to contracts formation in oil and gas industry. Based on the literature review and data analysis, it was confirmed that the existing processes for formation and selection of contracts in oil and gas industry are very rigid and prescriptive, and not always appropriate or optimal for a given situation. There is a need for a descriptive theory that reflects the operating environment in which project managers operate.

For this research, optimal contract is defined as a contract which uses the product of consideration of issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction through proper allocation of risks. This research further established the attributes of an optimal contract which is a set of characteristics which the PMs can use to measure against well accepted criteria for setting up a contract. It is required that for a contract to be optimal, it should meet all the attributes of an optimal contract. As discerned in the literature review, each organisation uses different methods in the establishment of their contracts. Therefore, these attributes provide a holistic and standard approach required by the oil and gas an industry in the formation of a contract.

From the existing literature and prior theory, this research has developed a new theoretical framework for the establishment of an optimal contracting formation in the oil and gas industry. The final theoretical framework which is classified by the

two main themes of this research, namely contract process and contract type, identified four key focus areas to establish an optimal contract. The four key focus areas are Contracts Methods, Drivers Identification and Selection, Risk Identification and Allocation, and Characteristics of PMs.

Finally, this research through the identification of the eleven attributes of optimal contracts and the final theoretical framework of contract has successfully completed the first step in the development of a descriptive theory of contract formulation. This 'descriptive theory' of contract in the oil and gas industry reflects the operating environment in which the project manager operates.

5.4.2 Implications for policy and practice

Government: The existing methods of contract formation and selection are criticised as very prescriptive. There are also numerous standards and regulations which are very prescriptive and rigid in nature. The need to comply with these standards is paramount and cannot be compromised. These prescriptive and rigid standards and regulations are drivers which corporations are directed or instructed by the national oil company to use in the selection of contract strategy. This research confirmed that non-compliance with these government standards and regulations could lead to withdrawal of licence to operate, withholding of fund and strained relationships with the international oil companies. The implications of compliance with these standards mostly result in the selection of contract strategies which are not always appropriate or optimal. The results are too often delays, cost overruns, and poor quality work.

In the literature review, it was established that the Government/NOC key drivers for contracts includes revenue, employment of citizens, sustainable development, local content, and environment. It was further established both in the literature and data analysis that alignments of these drivers are hardly carried out. Most Government or NOC drivers are considered as a given which must be complied with in the selection of contracts. There are examples both in literature and data analysis which confirmed

that the selection of these drivers mostly lead to suboptimal contracts. Furthermore, PMs work with *"fear"* of being punished for not complying with these drivers hence forced to accept the directives of Government or NOC in the formation of contracts even when it is very clear that the result of such directives will lead to suboptimal contracts. Example, based on the data analysis, it is confirmed that PMs are scared to 'say no' where a contractor is imposed on them.

Other stakeholders also have drivers which are sometimes not taken into consideration due to the mandatory compliance of Government or NOC directives. To establish an optimal contract, the alignment of all stakeholders' objectives is required. Non alignment of these objectives leads to suboptimal contracts hence delays, cost overrun and poor quality work. Whilst the importance of the Government / NOC drivers is noted. The drivers of the other stakeholders are also very important. Hence the need for PMs to identify the drivers, rank and prioritise the drivers and select the most relevant drivers to form the contracts. Anything short of this approach will lead to suboptimal contract. There are examples where IOCs have pulled out of some countries due to Government or NOC imposing unfavourable drivers on the IOCs. Going forward, this type of action by IOC will become the norm especially as IOCs become more risk averse coupled with the additional risks resulting from the sophisticated advanced technology required to drill oil from difficult and complex reservoirs (Casselman, 2011).

Oil and Gas Industry: Organisations typically have a contract formation process – one they see as optimal from the organisations point of view. That is the prescriptive framework designed to guide/govern project managers' behaviour. Different organisations use different approaches in the formation and selection of contract strategy. There is rarely any measurement against established set of attributes. It is industry-wide known fact that contracts are generally not optimal. Little is known about how PMs utilise this prescriptive framework or the operating contingencies that influence project managers interpretation of the prescriptive framework, which is surprising given the value of contracts in the oil and gas industry and the potential for savings.

The existing practice of selecting a 'technically qualified lowest bid' contractor is proven to be inefficient which results in using suboptimal contracts. This research confirms that value for money contractors are the most efficient and delivers cost savings hence optimal. It has been established that the selection of value for money contractor is a challenge in the current contract environment, but this research confirms that the alignment of all stakeholders' drivers will pave the way for the selection of value for money contractors.

Furthermore, the practice of selecting lump sum contract in order to transfer risks to contractors is against the basic principles of risks identification and allocation. This research confirmed that there are processes, people and tools related issues which does not support the identification and allocation of risks. This research also confirms that this process, people and tools issues can be addressed by corporations through the establishment of Risks Management Strategy. This will provide guidance to PMs in the identification, sharing, and allocation of risks to the parties that are best placed to manage them. Therefore, the existing practice where corporations develop contract quilt to guide PMs should stop in favour of using the most relevant variables in the decision of which contract to select.

Another finding of this research is the confirmation that there are severe shortages of experienced workforce in project management and contracts. This research confirms that owners' teams are generally inexperienced while the contractors' teams may also be incompetent. The progressive retirement of experienced engineers is confirmed as one of the reasons for these shortages. This exposes PMs to the risks of using suboptimal contracts due to lack of experienced guidance. This further highlights the need for the industry to set up competence development frameworks in Contracts supported by good programmes of on the job and classroom training for PMs and engineers. In addition, corporations should invest on recruitment and retention of engineers. A coaching and mentoring programme is also recommended for young engineers especially those in the graduate scheme to enable them attain

their full potential hence a robust succession plan for the retiring workforce (Watkins, 2003).

Furthermore, a combination of expert and local contracts personnel should be dedicated to supporting PMs in the projects at the project location. The existing practice of having contract engineers allocated on part-time and also the use of personnel without local knowledge in selecting contracts for projects is not efficient. This research confirmed that sound local knowledge is required to establish optimal contracts.

Finally, 'turning points' are not planned into the existing prescriptive contract framework used in contract strategy formation. This research confirmed that in long haul projects, a robust plan based on proper scenario analysis to manage "turning points" (Wack, 1985b) in the course of execution of the work is required. Therefore, scenario analysis is required to establish the robust plan and also build flexibility into the project contract execution strategy.

5.4.3 Implications for methodology

This research project has two main areas of interest relevant to its scope, viz. the Contract process and Contract types. To achieve the contract strategy formation improvement benefit proposed in this research, the contemporary phenomena have to be investigated within its real life context. Hence the case research within the realism paradigm is the most appropriate option, especially when the boundaries between phenomena and context are not clearly evident. The chosen case study design framework takes into account the methods used to collect the data to provide more perspectives to investigate the phenomena within its real life of oil and gas industry.

Data from various sources were collected from one oil and gas corporation and used to establish knowledge about external reality which may not be completely true (Guba & Lincoln, 1994). The targeted participants (respondents) in this research are

in various countries in the world. Therefore, the peculiarity of this case that is participants working in one company but in different locations was considered in choosing the data gathering techniques and instrument of inquiries. Hence Qualitative methods which are able to 'deploy a wide range' of interconnected interpretive methods were selected for this research.

The instrument used for data collection was designed in the form of a semi - structured interview but the administration of the tool was different from the traditionally known techniques of face-to-face or telephone interviews. Such flexibility is generally seen as acceptable in contemporary research. A mixed but flexible strategy of inquiry which takes into account access to the participants, convenience of the participants, and most effective option for obtaining the information was chosen for this research (Lee, 1999). The use of questionnaires to administer semi-structured interviews proved to be very effective because the researcher was able to focus on the research questions, the purpose of the research, and the information that would most appropriately answer specific research questions (Denzin & Lincoln, 2008, p. 33), and also reach a large group of participants in different countries.

This research is to a large extent exploratory, descriptive, inductive, analytical, testing and elaborating of established theory. Qualitative methods provided the required level of flexibility in the analysis of the data. Over one hundred pages of data were collected. The messy nature of the data and the need to take into account the 'context' of the data which is based on meanings expressed through words, collection which results in non-standardised data requiring classification into categories, and analysis conducted through the use of conceptualisation was one of the major factors in the selection of qualitative methods. Furthermore, this method also allowed the researcher to probe through one-on-one interview any misunderstanding in the data to obtain clarity from the respondents.

5.5 LIMITATIONS OF THIS RESEARCH

The main limitations of this research are detailed in chapter 3 (section 3.5 - the administration of the instrument for data collection). Measures taken to address the limitations where also discussed in chapter 3.

Another limitation is in the generalisation of the findings of this research for the oil and gas industry. This research was conducted using data provided by respondents from one oil and gas corporation. Though theory may have been built from the investigation of the research problem, the main limitation is in the difficulty with which the findings can be generalised. Further empirical research which builds upon the findings of this research in another oil and gas corporation will provide the evidence to compare and contrast the results of this finding.

Finally, as in all field studies, this research has limitations but every attempt was made to overcome these. Therefore, they should not detract from the overall value of the research and its findings.

5.6 APPLICABILITY OF THIS RESEARCH TO AN INDUSTRY OTHER THAN OIL AND GAS

Despite the limitations discussed in section 5.5, this research study was completed based on the rich quality data that was gathered and analysed to arrive at the findings. The researcher notes certain points that are relevant to his experience of contracting strategy formation outside of the oil and gas industry. The degree of applicability of a research finding to other population or samples is referred to as generalisation (Polit & Hungler, 1991; Ryan & Bernard, 2000). Patton (2002) used *extrapolations* instead of *generalisation* to describe the modest speculations on the likely applicability of findings to other situations. Others used words such as *relatability* (Bassey, 1981) or *transferability* (Lincoln & Guba, 1985). Denzin (1983), Wainwright (1997), Creswell (1998), and Hammersley (1990) support Lincoln and Guba (1985, p. 110) claim that the only generalisation is ‘there is no

generalisation'. The general idea of generalisation is that *a rich description of a single case or a reduced number of cases, if of good quality, will help practitioners see their own cases reflected and judge for themselves what is applicable in their own practice* (Stake, 1995a, p. 87). Furthermore, since qualitative research is very much influenced by the researcher's individual attributes and perspective (Schofield, 1993) and also qualitative methods provide *vicarious* link with the readers to give them a sense of 'being there' (Stake, 1995b, p. 63). Therefore, it is possible that the researcher can speculate (with caution) on the applicability of the findings of this research to other heavy engineering industries to illuminate or be suggestive of practice elsewhere (Mejia, 2008).

Based on the researcher's experience, telecommunication and mining industries stand out as some of the heavy engineering industries which share characteristics with oil and gas industry. The common characteristics are in the aspect of seeking new markets/developing infrastructure in new frontier areas and remote locations. Both industries depend heavily on technology and its associated risks. Most heavy engineering industries rely on contractors to execute work. The capital project phases are also in accordance with the stage gate approach. Though the views expressed below on the applicability of this research findings to other non oil and gas industry are not tested anywhere in this research. It is with 'caution' that the researcher explains the potential applicability of the findings to telecommunication industry based on his experience. Here is a summarised account of the researcher's experience below:

Researcher's example: A global telecommunication company which was exploring new markets in one of the countries in Africa lost the opportunity to progress, because of the rigid and prescriptive contracting process. The national government telecommunication and the UK based telecommunication company setup a local company to represent the business. The UK-based Telecommunication Company processes were deployed in the running of the local company. The UK-based telecommunications company head office had full control over the business from the head offices in UK. The processes and methods were very rigid, prescriptive and very frustrating for the local partners. The rigid and prescriptive process resulted in

the non-alignment of the stakeholders drivers. Furthermore, the UK-based company had no local knowledge of the contracting environment that they were moving into. The decision of the national government to seek new partners did not come as a surprise to most observers including some of the UK-based Telecommunication company employees.

Based on the above example, there are many aspects of the results of this research that can be speculated on with caution as potentially applicable or transferable to the telecommunication industry as follows: (i) the contract strategy formulation process is too lengthy and prescriptive hence the delay in establishing contracts for projects; (ii) alignment of drivers between contractor and owner is crucial to ensure a common goal to deliver the project objectives; (iii) there may be a high risk of selecting a suboptimal contract strategy due to national government or Joint Venture directives and interferences; (iv) corporate policy may prescribe drivers for the formation of contracts, with a consequent lack of flexibility and non-inclusion of some drivers in the contract strategy formation for projects; (v) the basic principles of risk allocation/assignment are not complied with in the allocation of risks in a given contract; and (vi) project managers are exposed to the risks of suboptimal contracts by not having experienced contract professionals in the project team.

Key note: It should be noted that the above generalisation await empirical verification.

5.7 DIRECTIONS FOR FURTHER RESEARCH

This research is the first step in the development of a descriptive theory of contract formulation in oil and gas industry. Eleven attributes of optimal contract were confirmed in the descriptive framework. These attributes were developed through inductive analytical generalisation rather than statistical generalisation. Furthermore, this research was conducted in a case study design within the realism paradigm. As discussed in section 5.5, future research could be undertaken to test the theory using

surveys and quantitative modelling. Quantitative and qualitative research methods are complementary nature. Quantitative methods may suit research which is aimed to test the findings of this present research which was conducted using qualitative methods.

Furthermore, a replication of this study based on semi-structured face-to-face interview (inquiry) qualitative methods in a different oil and Gas Corporation may be necessary to confirm the result of this research and to enable generalisation of the descriptive theory of contract established in this research.

Another area of future research is on how to design optimal incentive schedules. An optimal incentive schedule is one of the attributes of optimal contracts established in this research. Payment scheduling and contractor motivation is necessary to establishing a good owner-contractor relationship and reduce project cost (Berends & Dhillon, 2004). Rose and Manley (2005) also agree that a financial incentive is a mechanism to promote and gain contractors commitment to client's goals (Rose & Manley, 2005). In designing financial incentives, it is imperative that it should be balanced in such a way that other drivers do not suffer. Incentives that target cost are likely to challenge quality. Similarly, incentives that target time risk challenging safety, quality, and productivity (Hartman, 2003). There are positive examples of projects in which financial incentives have helped the owners to achieve project objectives. For example, Heathrow Airport (UK) terminal 5 project will contribute immensely to improving contract strategy formation generally through substantiating how the financial incentives were designed and applied. Overall, it is proposed that future research should investigate how financial incentives can be effectively designed and applied as a component of the project contracting strategy.

5.8 CHAPTER CONCLUSIONS

This chapter concludes the study. It presented the conclusions to each of the four research issues and contrasted the key findings in chapter 4 with those established in

the literature review (chapter 2). It was established by this research that most contracts used in the oil and gas industry are always not appropriate or optimal. This research provide a definition of optimal contract as a contract which uses the product of consideration of issues such as world markets, current company strategy, skill availability, supplier and contractor availability and integrity, environmental and local issues to deliver cost reduction in Capital Projects through proper allocation of risks. The final theoretical framework of this research establishes a 'descriptive theory' of contract in the oil and gas industry that reflects the operating environment in which the project manager operates.

In conclusion, by establishing a 'theory' of contract formulation in the oil and gas industry that better reflects the operating environment in which project managers operate, this research has made a useful and potentially significant contribution to the gap in knowledge of contract formulation in the oil and gas industry, an industry which anecdotally suffers from delays, cost overruns, poor quality work.

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Appendices

Appendix A: Hot-Button Risks

Number	Risks	Description
1	No Damages for Delay	Limit or exclude recovery of damages for owner-caused delays
2	Consequential Damages	(i) For the owner it includes loss of revenue or loss of beneficial occupancy resulting from delay. (ii) For Contractor – loss of potential business and loss of advantageous weather conditions. Consequential damage is not limited to damages caused by delays.
3	Indemnity	Indemnification ("hold-harmless) clauses attempt to limit the liability for the personal injuries of contractor employees, owner employees, and third parties.
4	Ambiguous Acceptance Criteria	Acceptance criteria which includes phrases that specify that the work be completed so that it is fit for purpose or to the owner's satisfaction.
5	New or Unfamiliar Technology	This clause refers to functionality risks of new technology which is not currently properly allocated.
6	Force Majeure	"Act of God" clauses. Who takes these risks? Insurance company may go insolvent when this risks materialize e.g. Hurricane Katrina, etc.
7	Schedule Acceleration	Limitation on the indirect cost that the contractor is allowed when owners mandate acceleration at any time.
8	Cumulative Impact of change orders	Compensation measures for indirect costs associated with resultant loss of productivity for the contractor is not documented and agreed in advance.
9	Owner mandated subcontractors	Allocation of an owner mandated subcontractor's performance should be clearly stated in a contract clause.

		If owner limits the contractor's choices of subcontractors, then they should take the risks for non-performance of the subcontractor.
10	Insurance Allocation	Contingencies to account for insurance deductibles. Since the contractors does not know upfront what the insurance deductibles will be. They are not properly estimated in the bids. Who takes the risks for under estimation, and insolvency of the insurance company?
11	Differing Site Conditions	Existing site conditions may be different from those on the contract documents. Yet owners state in the contract that it is the responsibilities of the contractor to verify the drawings.
12	Design Responsibility	Design responsibilities should be given to the party with controls over the design and can survive financial consequences of an insufficient design.
13	Waiver of Claims	Time limit for the discussions of delay waivers is inappropriate. Appropriate allocation of final claims should be discussed.
14	Standard of Care	Design professionals are required to perform their duties to highest and best industry standards.

Source: This table is a full extract from the work done by CII Research team on Equitable Risk Allocation (Construction Industry Institute, 2006).

Appendix B: Consent to provide Data for Research

Queensland University of Tech Brisbane Australia	**PARTICIPANT INFORMATION FOR QUT RESEARCH PROJECT**

Structured Contract Strategies for Capital and Operations Expenditure Projects in Oil and Gas industry

QUT Ethics Approval Number 1100000464

RESEARCH TEAM

Principal Researcher:	Cletus Ikhinmwin, PhD Student, QUT
Associated Researchers:	Assoc Prof Paul Davidson and Dr Robert Thompson, QUT

DESCRIPTION

This project is being undertaken as part of PhD research by Cletus Ikhinmwin.

The main objective of the research is to improve the contracting strategies formation process and to provide flexible options tailored to different scenarios in the use of any given contract type in the Upstream Oil and Gas Industry. Contract strategy formation process covers the activities carried out to outsource a piece of work (to design, build/construct, or maintain facilities or assets); and the activities to engage a suitable contractor to carry out the work. The key deliverables of the research is to provide a solution to support the selection of a cost effective and optimised Contract Strategy for Capital Projects.

You are invited to participate in this project because you have the required experiences and background which is essential for this research.

PARTICIPATION

Your participation in this project is entirely voluntary. If you do agree to participate, you can withdraw from the project at any time without comment or penalty. Your decision to participate, or not participate, will in no way impact upon your current or future relationship with your employer. Please note that you are not able to withdraw once you have submitted the questionnaire. The information provided will be used in accordance with the privacy and confidentiality statement below.

Participation will involve completing a 16-item anonymous questionnaire with exploratory response which will require you to provide some descriptions in writing. You can choose to complete the questionnaire in electronic or paper form. It will take approximately 60 minutes of your time. Questions will include (i) describe the current contracting formation processes used in your organisation; (ii) What are the main issues or problems with the current contract process; (iii) list the most popular contract types used in your organisation.

If you agree to participate you do not have to complete any question(s) that you are uncomfortable answering.

EXPECTED BENEFITS

It is expected that this project will not benefit you directly. However, it will benefit the Oil and Gas industry and contribute to the existing body of knowledge.

RISKS

There are no risks beyond normal day-to-day living associated with your participation in this project.

PRIVACY AND CONFIDENTIALITY

All comments and responses will be treated confidentially. The names of individual persons and their employer/Company are not required in any of the responses.

The project is funded by CIEAM. The funding body will not have access to the data obtained during the project. Access to the original questionnaire submitted by you will be restricted to the Researcher and Supervisor. Where you have mistakenly

provided your name/personal identity or company name; such information will be removed from the data. The email address used by you to submit the questionnaire will be deleted.

The information that you provide will be used for this research project only. Please note that non-identifiable data collected in this project may be used as comparative data in future QUT projects.

CONSENT TO PARTICIPATE

Due to the nature of the project the return of the completed questionnaire will be taken as consent.

QUESTIONS / FURTHER INFORMATION ABOUT THE PROJECT

If have any questions or require any further information about the project please contact one of the research team members below.

Mr Cletus Ikhinmwin – PhD student	A/Prof Paul Davidson – Supervisor
Email Cletus.ikhinmwin@student.qut.edu.au	Email p.davidson@qut.edu.au
Phone + 60 128 704 255	Phone +61 7 3138 1248
	Mobile phone +61 414 641 364

CONCERNS / COMPLAINTS REGARDING THE CONDUCT OF THE PROJECT

QUT is committed to research integrity and the ethical conduct of research projects. However, if you do have any concerns or complaints about the ethical conduct of the project you may contact the QUT Research Ethics Unit on +61 7 3138 5123 or email ethicscontact@qut.edu.au. The QUT Research Ethics Unit is not connected with the research project and can facilitate a resolution to your concern in an impartial manner.

Thank you for helping with this research project. Please keep this sheet for your information.

Appendix C: Questionnaire

Queensland University of Technology, Brisbane

PhD Research Project

Research Title: Structured Contract Strategies for Capital and Operations Expenditure Projects in Oil and Gas industry

PhD Research Questionnaire

Section A

Please complete section A with basic information about you and your experience. Please do not include your name or personal identification details:

1) **Job Title:**
2) **Work Location:**
3) **Specialisation*:**
4) **Sex:**
5) **Industry Experience (Number of Years only):**
6) **Project Management Experience (Number of Years only):**
7) **Date this questionnaire was completed:**

this refers to the appropriate categorisation for your present job. Example: Supply Chain Management, Project Management, etc

Section B

Please complete all questions in section B. Please do not include your name, personal identification details, or company name in your answer:

Q1: Describe the current contracting strategy formation process in your organisation?

Q2: What are the main issues or problems with the current contract process?

Q3: List the most popular contract types used under the current contracting environment?

Q4: What are the reasons for the selection of these popular contracting types?

Q5: Does the process for selection of Contract strategy change depending on Contracting type selected?

Q6: How do you define what a 'correct' or 'optimal' contract is?

Q7: List potential areas in the contracting process that costs could be reduced?

Q8: How can cost reduction be achieved in the listed contracting process?

Q9: What are the payment structures used for a given contract?

Q10: What are the factors taking into considerations in the design of payment structure for a given contract?

Q11: What are the characteristics of a person, their positions, their assumed experience and general background involved in contract strategy formation?

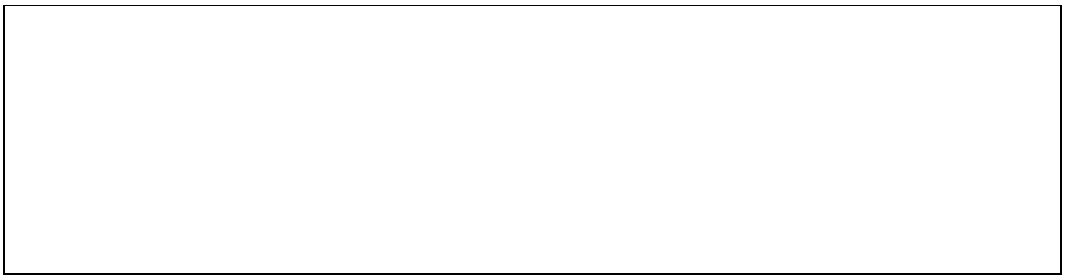
Q12: What do you consider adequate qualifications, experience, and background for a person to be able to develop a contract strategy?

Q13: What tool(s) are used by your company to arrive at a decision for selecting appropriate Contracting Strategy? Is this tool adding value to the process? Why?

Q14: What is your experience in designing and using positive and/or negative incentives?

Q15: How is contract associated risks identified in a capital project

Q16: How is the contract associated risk assigned between contractors and the owner



Appendix D: Illustrative Quotes/Extract - The Contract Strategy Formation Process

Research Issue	**1**
Theme 1.1	**Contract Strategy Formulation process is too lengthy and prescriptive hence the delay in establishing contracts for Projects**
Interview Questions Focus Area	**The Contract Strategy Formation Process**
Respondent	**Illustrative Quotes/Extracts from the interview**
CS014	Market Competition does not favour fixed price contracting at this time. Inadequate scope development does not favour fixed price contracting. Owners, such as Company X, favour fixed price contracting in order to transfer the risk and reduce the size and capability of their management team. Some contractors that have a project with a well-developed scope and the likelihood of few changes prefer fixed priced contracts in order to make more profit.
CS029	The following risks should be addressed and evaluated during the pre-award phase: Is my scope clear and have I invested time to come with clear scope of work?
CS014	The advantage of the reimbursable contract is that you can work with poorly defined scope and excessive changes without being involved in claims. Company X also has all the control tools to properly manage a project if it is a reimbursable contract. Company X will develop engineers that better manage a project, since they will now be involved in problems that were often considered to be the contractor's responsibility on lump sum contracts. Company X will be able to obtain the best EPC contractors since they do not need to do fixed price work and are only looking for reimbursable projects at this time. Company X can develop alliance contractual arrangements that benefit both parties

	for long periods of time.
CS015	If there are severe time constraints for the project and the time required to tender the work is not available. The effort by Company X in controls is about the same.
CS009	Contract and Procurement (C&P) strategy development: unclear scope, more a tick in the box exercise rather than a fit for purpose solution.
CS002	12 rounds of pre-qualifications were required consisting of in excess of 200 clarifications. Technical Clarification meetings are discouraged – I would advise to undertake such meetings so that clarifications can be resolved more expediently.
CS034	Inefficient decision making within Company X (e.g. allowing too many changes in projects, taking too long to arrive at firm conclusions)
CS025	The current contracting process includes (a) establish scopes and spend (b) develop strategy (c) develop tender package (d) tender (e) evaluate and award. Main issues are scopes not fully defined, insufficient tender information, lengthy tendering process, scopes are not fully understood, rigid tender board requirement, wrong strategy, lack of good cost estimate, contract document poorly prepared and etc.
CS028	This stretches from pre-DG-3 to FID and execution, with the most intense periods being during concept selection and contract strategy development. Once the contract strategy is approved, a contract tactics workshop will follow to establish the most effective tactics for realizing the objectives of the contract strategy.
CS028	Main issues are: time between strategy development and award is variable but is typically 2 to 4 years, by which time market conditions and the operating environment would have changed significantly. Other issues include: JV funding challenges; late concept and design changes; JV directives on contract strategy which sometimes ignores serious risks or unrealistically transfers these risks to contractors; and unrealistic schedule promises decoupled from volatilities in the operating environment.

CS008	I am of the opinion that as with design, it is very important that as much effort is put into early contract strategy and planning as soon as is possible. In this way, hopefully, there are no last minute "surprises" when for example a contractor fails to deliver later on.
CS004	Main advantage is the fact that pre-qualification should prove that the Contractor is capable to do the work in the first place.

Appendix E: Illustrative Quotes/Extract - The Contract Selection Criteria

Research Issue	**1**
Theme 1.2	**The Selection of Value for Money Contractor is the most practical option to reduce the cost of projects through contracts**
Interview Questions Focus Area	**The Contract Selection Criteria**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS025	The main drivers are to deliver the business safely, timely and within budget (value for money) with no claims and variations.
CS020	High pressure from project developers and financers to go for lowest price, but project manager would prefer best value for money bid. He generally loses …
CS024	Lowest bidder is not always cheap in a lifecycle cost when quality of contract management and HSE is a concern. It is always costly to have cheap contract initially but a lot of resources will be required to manage them during execution of contract.
CS025	In most cases, the lowest bidder will be selected. Vendor always bids low in order to secure a contract. Problems start to develop during contract's execution e.g. lack of competent personnel, inadequate tools/equipment and contractor's staff complained about low salary.
CS026	Lowest bidder usually means there will be problems; they either don't have the resources to get the job done well, or they won't go above and beyond to finish a job that might not be very profitable. In all bid evaluations, it is paramount to evaluate based on total cost of ownership (TCO). Value for money bidder may seem expensive at first glance, but the TCO will throw lights to the lifecycle cost.
CS027	Value for money bidder should be the most preferred option any time.

CS027	JV partner directives also introduce stringent conditions for deviating from the lowest bidder approach, and therefore placing a huge burden of proof on the operator advocating this deviation
CS029	The lowest bidder is based purely on the value of the commercial proposal. Value for money bidder means that the money you pay to the contractor commensurate to the Technical merits and quality of work being delivered.
CS029	The best value for money contract is the one that emerged from the competitive bidding.
CS030	The comments validity depends on the project, a small, simple short project that is a say repeat project could easily go to the lowest bidder. However as projects become larger and more complex it is important that the bidder has fully understood the work scope and often the lowest bidder may end up being more expensive.
CS031	Interesting. One should clarify why a bidder appear to be the lowest. The bid should be analysed to ensure the bidders full understanding of the tender requirement. Very often these bidders turn out to the not-so-lowest-cost contractors as they generally intentionally excludes a few scopes
CS036	Lowest bidders: cut corners/quality of work, look for every possible change.
CS036	Value for money bidder: more control, more transparent, better quality of work
CS007	The joy of a discount will be long gone over the joy of quality. Always be careful with this, is it quantity or quality you're after. It also depends on what the contract contains. Is it aggregate or a Frame 9 compressor who will determine the reliability of the project!

CS013	There is always a risk in going forward with the lowest bidder. Is his price low, because he did not fully understand the scope of work? He may even have priced the scope of work incorrectly (in this case too low) as he is inexperienced with the type of project. Or is he coming in low, just to win the job, and then later on recover his costs via an aggressive claims approach? Other bidders may have set their prices high, because their work portfolio is over loaded and they are reluctant in declining to bid straight away. Evaluating a bid, determining the right price, is therefore not an easy task.
CS001	You tend to get what you pay for. There is some research that shows that the actual final cost of the project tends to be toward the middle of the spread of bids, so awarding the contract to the low bidder does not necessarily mean you will end up with the lowest price.
CS018	Company X: 1) Many delays and a fire during the start-up caused by a Novelty process design. 2) Explosion of the O2 unit after about two years of operation, caused by relying on third party technology. XXXX base project: CW piping corrosion, wrong water treatment program. CRI Catalyst plant of Country G: small delay and small cost overrun, caused by an incompetent contractor. The selection was imposed by management from the US. XXX plant in Country A: A very special membrane filtration unit failed twice, because of a cheaper supplier than a proven one (thus a Novelty issue).
CS030	Reimbursable contracts in an alliance relationship where the main issue was scope growth/ scope creep ie costs increased through multiple small changes rather than big scope changes. Changes always appear to be warranted and hard to control.

Appendix F: Illustrative Quotes/Extract - Project Objective – Alignment of project goals

Research Issue	**2**
Theme 2.1	**The alignment of drivers between contractor and owner is crucial to ensure a common goal to deliver the project objectives**
Interview Questions Focus Area	**Project Objective – Alignment of project goals**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS010	It is the chance to develop different solutions (technical and process) which can be compared to come to the best solution for the Stakeholder(s). Sometimes there are different process methods with licenses owned by different companies.
CS015	Ensuring the deliverables are compatible with the capability and objective of the contractor – any mismatch can lead to friction which will then detract from the completion of the work. These differences could be about continuity of personnel, profit expectations, risk allocation, extent to which sub-contractors will be used, etc. This approach will probably not result in the lowest absolute contract cost to Company X but should achieve the overall project outcome better.
CS005	Previous work record looked in at pre-qualification/technical evaluation phase. · Or this can be done by surveying the companies, market intelligence and risk workshops.
CS020	HSE-culture: we should have audited the selected EPC contractor upfront: the HSE-culture difference between this civil contractor and the Company X oil & gas standards would have been obvious, but only became clear now during the project.
CS024	Although every effort is being made to the contractor on the main objectives of projects during tender briefing etc., it is always very difficult to forget that contractor has a different objective i.e. making as

	much profit from the contract. This is normally the case when there wasn't enough knowledge about the contractor or there was no plan for the contractor to have a longer term presence or commitment to work for the company.
CS009	Negotiation and award: the team who will delivered are not (sufficiently) involved, no ownership, contract perceived as a mean rather than a vehicle, attitude that ambiguity can be opportunistic, done in isolation.
CS009	Contract execution: cultural differences around contract binding obligations (once signed, negotiations can start!), no trust and professionalism, different agendas, courage, misunderstanding the contract, incompatible (leading) personalities, different values and norms, poor steering committees, not fencing disagreements form the day-today management of challenges and issues, unclear appropriate team management, no project leadership empowerment/mandate.
CS020	All-inclusive EPC contract, which led to very little control over and influence on the works. The contractor chose (obviously) for the cheapest suppliers and equipment, meeting the specs but often not our expectations. For example we often suggested hiring higher capacity installation equipment with lower weather downtime, but the contractor consequently went for the cheapest equipment he could get.
CS030	I believe that in all cases "trust" and "strategic fit" will be the underlying forces of the success of strategy as this one (in reference to optimal Contract Strategy).

Appendix G: Illustrative Quotes/Extract - Project Objective – Alignment of project goals

Research Issue	**2**
Theme 2.2	**the risk of selecting a suboptimal contracting strategy is very high due to National Oil Company or Joint Venture directives and interferences**
Interview Questions Focus Area	**Impact of NOC and JV Directives on Contract Formulation**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS010	Some schedules are dictated by politics or client desire and not based on a realistic schedule. Final Investment Decision (FID) dates are moved, strategies changed, scopes changed but RFSU dates are not moved accordingly.
CS002	Some stakeholders challenge our costs as not fit for purpose, yet we are directed this route via the business objective of satisfying the Owner's (NOC) aspirations for technology and capability transfer
CS017	From contract point of view, change of works that have an impact on the commercial or contractual obligation could be considered as challenging. For Company X, if this occurs, a Change To Contract paper has to be raised and presented to a number of Committees, including NATIONAL OIL COMPANY (NOC) for final approval. In these sittings, Company X will have to provide strong justifications on the request, especially if it is a retroactive one. Upon completion of the presentations, Company X will have to wait for final NOC approval, which does not have any specific time frame for the authority to do so.

CS017	Causes: 1) shortage in the market place, 2) legal aspects and competitive laws 3) new/unfamiliar contractors to Company X standards/processes, 4) prevent to find ourselves with no competition during EPC tendering, 5) not defining real contractor costs and measurable parameters/not close monitoring.
CS026	Cost Reimbursable with Incentives - Company X bears most risks and pays for all mistakes contractor made. Budget and schedule overrun anticipated. Incentive is not attractive enough to motivate the contractor to perform.
CS02	Main issues are: time between strategy development and award is variable but is typically 2 to 4 years, by which time market conditions and the operating environment would have changed significantly. Other issues include: JV funding challenges; late concept and design changes; JV directives on contract strategy which sometimes ignores serious risks or unrealistically transfers these risks to contractors; and unrealistic schedule promises decoupled from volatilities in the operating environment.
CS017	Based on NATIONAL OIL COMPANY (NOC) Procedure, Pre-qualifying of bidders via a certain set of criteria prior to tender is not allowed.
CS002	Contract Strategies have remained the same for the last 3 years. These are typically aligned with the Owner's (NOC) aspirations for technology and capability transfer

Appendix H: Illustrative Quotes/Extract - Corporate policy prescribe drivers for formation of contracts

Research Issue	**2**
Theme 2.3	**corporate policy prescribes drivers for the formation of contracts hence lack of flexibility and non-inclusion of some drivers in the contract strategy formation for projects**
Interview Questions Focus Area	**Corporate policy prescribe drivers for formation of contracts**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS013	In the current market, EPC contractors have high workloads and as such are not always interested to execute a project. Especially if they have not been involved during the definition phases, they are reluctant to bid on a project, assuming they are at a disadvantage to the FEED contractor. This makes competitive bidding on a Project Specification very difficult. In order to ensure more than one party is bidding for the project, a "design competition" can be considered. Two contractors develop a Project Specification and in addition submit a bid for the project.
CS018	Avoidance of cost overrun, therefore the Lump sum preference. No experience with reimbursable contracts, which requires quantity surveyors. Hardly experience with Cost plus contracts

CS031	The pre-qualification process is probably as clear as mud to most contractors. Elements included in the pre-qualification are usually not defined properly. Process is also not clearly routed. The pre-qualification process generally should go to the Supply Chain Department that will inform the Work Category Custodian who then will pass the documents to the technical and financial department for approval. Very often contractors approach the contract holder straight on in the bid to shortcut the process. Contractors sometime directly speak to higher management of the intent
CS024	Over ambitious schedule / planning; Lacks of knowledge in Risks Management; Wrong strategy for contracting; Lacks of skilled resources/people; Competing with each other for same external resources; Lacks of stakeholder management with contractors; Lacks of project management skills; Too rigid procedure to maximize contractor potential in realizing projects; Lacks of good/effective incentive scheme; Lacks of skilled contractors.
CS010	In my opinion the conjunction between Project Governance Process and Procurement Process has to be improved.
CS036	Main problems encountered in project development:1) find a qualified contractors to do Definition of the project,2) lengthy process for signature of secrecy agreement 3) More resources for verification/approval of the work, 4) dual contracts for development, 5) cost overrun. Causes: 1) shortage in the market place, 2) legal aspects and competitive laws 3) new/unfamiliar contractors to Company X standards/processes, 4) prevent to find ourselves with no competition during EPC tendering, 5) not defining real contractor costs and measurable parameters/not close monitoring.

CS014	I cannot respond for Company X, but in general, the scope is not well-developed when the project is undertaken. There are numerous changes that increase the cost and lengthen the schedule. Jobs are accelerated with little chance to recover schedule, but costs are excessive. Risks that were not identified impacts costs and schedules. Competition for management, engineering and labour resources is causing significant cost and schedule pressures. Material cost increases and delivery delays are impacting jobs. Company X is constructing projects in hostile environments with little, if any, infrastructure.
CS041	Return to the practice where the professional Contacts Manager or Engineer assigned to the Project, guides the Project Manager through the process and drives the technical folk to pursue and complete key pieces of work and activity to the required standard. Expecting a range of different participants to follow processes such as the Contractor Selection and Management Process just isn't working.
CS015	Significant effort is required to get this right. We must not be scared to say 'no' to a contractor if we have good reason.
CS023	Can and is very much dependent on the Projects Capex Cost, Type, Complexity and the Business sector. Typically Upstream use reimbursable (with Target Incentive Schemes), Gas & Power LNG Projects (Lump Sums), Downstream Large Projects (Lump Sums), Smaller <$USD 20 Reimbursable with Incentives or Site Alliance Target Cost contracts
CS030	EPC for large projects e.g. LNG construction, reimbursable for smaller less defined contracts.

Appendix I: Illustrative Quotes/Extract - Reimbursable Contracts vs Lump Sum contracts

Research Issue	**2**
Theme 2.4	**Reimbursable contracts produce better quality work at lower cost than lump sum contracts but companies prefer lump sum contracts.**
Interview Questions Focus Area	**Reimbursable Contracts vs Lump Sum contracts**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS010	I have currently no experience. The problem is that even if you have a reimbursable contract claim management will be necessary.
CS023	Company X has a Project Risk Management Process to capture, (take, treat, terminate) and review project wide risks. In terms of Contractor taking risks in Capital Projects these are assessed and incorporating into Capital Estimates, as Risk premia. In terms of a system/or process used to show the Capacity for Contractors to take these risks and how or if this assessed during pre-award – not aware.
CS041	1) Little or no risk to the bidding Contractors so pricing will be keener reflecting the lower risk 2) Contract planning and award cycles can be shortened vs a lump sum (LS) arrangements
CS006	More detailed cost and other project information is available. This enables you to spot problems in a project sooner. The (cost) information gained from the project will help improving future projects as well. This type potentially leads to fewer disputes.
CS007	Reimbursable contracts might have high quality. As the contractor gets paid for every item he purchased/man-hour spent. On LS contractors the owner does not have audit rights on the contractors cost. You cannot see where the money went to, shortcuts could be taken, cost savings possibly jeopardizing the project quality.

CS008	The disadvantage to Company X is that the lump sum contract allows many of the cost risks associated with the Project to be "passed on" to the contractor. This means that in terms of the likely project cost, the reimbursable will be cheaper of the two – namely the contractor will not load his bid with risk premiums and from Company Xs portfolio management viewpoint Company X will have a "ring fenced" project cost
CS009	Ability to manage and implement changes (e.g. schedule driven projects) at less risks when adequate considerations are given in the formation of the owners' team. Higher level of capability and experience development of the owner, which might be very useful if project scope has to be "duplicated" for multiple internal clients and could for sub-sequent projects be converted to Lump Sum (LS).
CS036	Lump sum contracts are excessively expensive nowadays (transfer of risks to contractors and pay for it) and the quality of work may suffer as contractors will try to fit the work, these contracts are not transparent and not flexible to changes. Reimbursable contracts give more insights on the work done and more control. Where new technology is involved it is more cost effective to make changes under reimbursable contract.

Appendix J: Illustrative Quotes/Extract - Non Compliance with principles of Risks allocation

Research Issue	**3**
Theme 3.1	**The basic principles of risks allocation/assignment are not complied with in the allocation of risks in a given Contract.**
Interview Questions Focus Area	**Non Compliance with principles of Risks allocation**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS020	Market conditions: in the overstressed wind turbine and contracting market, we are being forced from the preferred EPC contracts towards multi-contracting. Company X always prefers EPC (I): more expensive but least risk.
CS008	There are many drivers which in many ways "dictate" the best contract strategy for any particular project, Clearly cost control and schedule management are significant, but so too is knowledge about the location, labour, technology etc., these issues relate to the project "risks" and the contract strategy to some extent is shaped by how much of the risk we wish to either "carry ourselves" or indeed pass on to the contractor(s).
CS009	For the projects I have worked on, the main driver has always been to explore the strategy, which delivers the right (for all parties) risk distribution as that will heavily constitute one of the major incentives to project success. I realize that this is easier said than done since the commercial environment, drivers and company's strategies (dictating the appetite) might not always be in line with the above.
CS023	Indirectly, Project Risk Management Process and Register should capture and assign Project Risks between Company X and Contractors
CS020	Risks should be allocated to the party that can best manage these risks. However, civil contractors will in the future no longer be prepared to

	accept for example risk of weather downtime or increasing steel prices.
CS028	Are risks identified and allocated to the right party? Not in about 60% of the cases!
CS029	As long the risk allocation is part of the contact, then no problem. Yes
CS030	I am not aware especially as main experience has been reimbursable contracts where the client deliberately takes the risks to give a lower overall cost.
CS004	This depends on how well the scope can be defined, how big the risk is and whether Company X/Shareholder is willing to 'buy off' this risk.
CS001	The basic principle is that risk should be allocated to the party best able to handle the risk. When the market forces favoured the Owner, I saw too many contracts where the Owner shifted any risk they did not want to the Contractor, with no regard to either party's ability to handle the risk. This has led to a number of huge claims, some projects experiencing extreme cost and schedule overruns, and some contractors going out of business.
CS012	Depends on the risk tolerance level of both parties and who best can handle the risk. Yes – Risk assessment and management process
CS001	It depends. Some parties manage risk realistically, and some "hope" that the risk doesn't occur.
CS024	Company X is not the best company to identify and manage project construction risks. Managing uncertainties / risks skills have to be upgraded in Company X contract managers as it involves huge potential saving when it is done correctly. Company X only make reference to contractors past (on paper) experiences during pre-qualifications or tendering. There should be an exercise to interview contractor past clients and make as much due diligent to the contractor. This includes detailed analysis of financial standing of the potential contractors through interview with Banks and financial institutions.

CS041	Financial robustness, a Company estimates that covers probability (P) P10, P50, P90 so that the amount of risk that a Contractor is pricing in can be assessed, a good risk management system and attitude to risk management established during technical evaluation, reviewing the past history through other Client references
CS003	Very basic and not well structured! Risk registers are developed and maintained on major projects.
CS001	… I think generally project risk management is not done thoroughly enough.
CS009	Assuming that risk transfer has been allocated properly and that the Contract and Procurement (C&P) strategy developed for this specific project has identified the "best" parties position (ability and willingness related to people, processes and tools) to take the different risks either at venture or at project level.
CS011	In the current market situation all risk (even if they don't occur) will be priced and paid for by Company X
CS001	Insufficient scope definition, insufficient risk identification and assessment, poor change management, and too much reliance on "hope" rather than reality.
CS034	In a number of cases, one or more of the following: - inadequate front-end development (e.g. inadequate risk analysis / proactive measures) - inefficient decision making within Company X (e.g. allowing too many changes in projects, taking too long to arrive at firm conclusions)
CS027	My exposure has been largely limited to Lump Sum contracts from clients (since I worked for EPC org.) and from EPC organization to contractors generally on Unit Rates basis. The L/S contractors tend to be conservative and price for all foreseeable risks. However, if the situations / risks during actual execution go beyond range, Lump Sum contracts start losing money and do not get compensated by customers.

Appendix K: Illustrative Quotes/Extract - Local Knowledge and Contract Formulation; and Incomplete team capabilities

Research Issue	**4**
Theme 4.1	**Personnel responsible for making contract strategy decisions should have sound local experience which includes good knowledge of the local market and local stakeholders**
Theme 4.2	**Project Managers feels exposed to the Risks of suboptimal contracts by not having experienced Contract professionals in the Project team.**
Interview Questions Focus Area	**Local Knowledge and Contract Formulation** **Incomplete team capabilities**
Respondent	**Illustrative Quotes/Extracts from the email interview**
CS036	Cost effectiveness, quality of work, reflection of the market at the project location, capability of the contractor, local content, project risks (with input from expert).
CS005	Project definition at contract award, Level of technology involved, Market analysis, Regional factors and local content requirements, Requirements of stakeholders (government, partners in joint venture etc.).
CS024	Interview with the potential contractor management are seldom made to ensure the contract will be managed by competent personnel.
CS030	Main challenge was a frontier location with no existing contractors with experience to meet the requirements. Therefore it was new territory for not just Company X but also the contractors and this was not considered when an aggressive cost and schedule was awarded under lump sum.
CS009	Contract execution: cultural differences around contract binding obligations (once signed, negotiations can start!), no trust and professionalism, different agendas, courage, misunderstanding the

	contract, incompatible (leading) personalities, different values and norms, poor steering committees, not fencing disagreements form the day-today management of challenges and issues, unclear appropriate team management, no project leadership empowerment/mandate.
CS008:	None- However I would like to make a general comment on this questionnaire and of the course material to date (up to 3b)- For people like myself who have worked for Company X for 33 years (but who have not directly been involved in contracts) it is likely that we lack the "personal experiences" on which the course seems to rely. I would like further reading/ materials / books etc to allow me to get up to speed prior to the commencement of the course
CS032	Major problems are: · lack of Company X /Contractor good relationship · lack of thorough contractor assessment · lack of detailed planning · lack of robust flexible contracting strategies · lack of experienced personnel for location of project.